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May 2000

Miller®

The Power of Blue.

Processes

Stick (SMAW) Welding

TIG (GTAW) Welding

MIG (GMAW) Welding

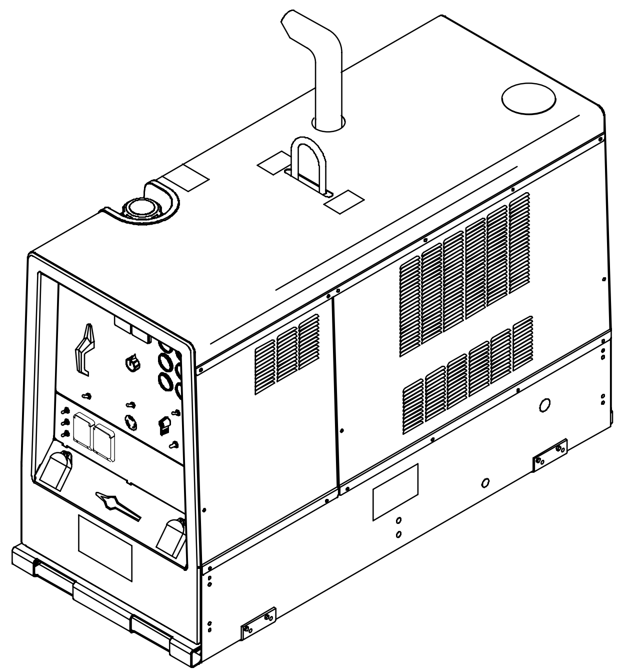
Flux Cored (FCAW) Welding

Air Carbon Arc (CAC-A) Cutting and Gouging

Description

Engine Driven Welding Generator

Big Blue® 402P, 502P, 602P



OWNER'S MANUAL

MANUAL DEL OPERADOR

(cuando disponible) sigue al manual en inglés

Visit our website at

www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.



That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.



Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**



TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller® *The Power of Blue.*

TABLE OF CONTENTS

⚠ WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

⚠ WARNING

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The following terms are used interchangeably throughout this manual:

Stick = SMAW
TIG = GTAW
MIG = GMAW

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



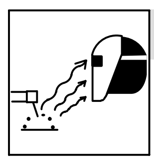
ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after stopping engine on inverters.

- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.



FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

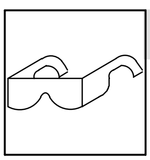
- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



WELDING can cause fire or explosion.

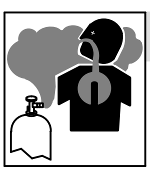
Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



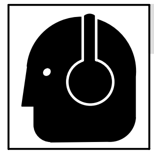
BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



HOT PARTS can cause severe burns.

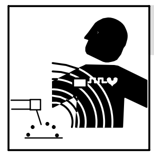
- Allow cooling period before maintaining.
- Wear protective gloves and clothing when working on a hot engine.
- Do not touch hot engine parts or just-welded parts bare-handed.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

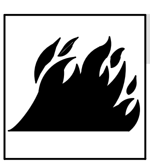


CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

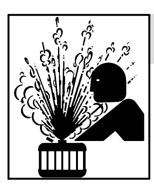
- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Engine Hazards



FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank – allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.



STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.



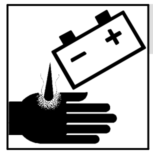
MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (−) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall panels or guards and close doors when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.



BATTERY EXPLOSION can BLIND.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles.
- Observe correct polarity (+ and −) on batteries.
- Disconnect negative (−) cable first and connect it last.



BATTERY ACID can BURN SKIN and EYES.

- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.



ENGINE EXHAUST GASES can kill.

- Use equipment outside in open, well-ventilated areas.
- If used in a closed area, vent engine exhaust outside and away from any building air intakes.



ENGINE HEAT can cause fire.

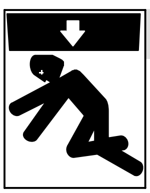
- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.



EXHAUST SPARKS can cause fire.

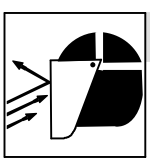
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas − see applicable codes.

1-4. Additional Symbols For Installation, Operation, And Maintenance



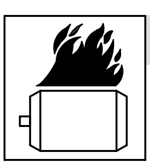
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



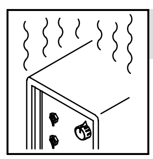
FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



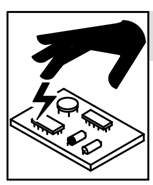
OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.



OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



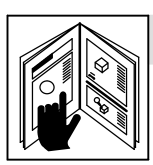
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



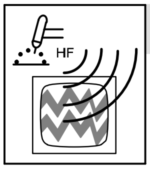
TILTING OF TRAILER can cause injury.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.



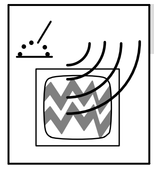
READ INSTRUCTIONS.

- Use only genuine MILLER replacement parts.
- Perform engine maintenance and service according to this manual and the engine manual.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-5. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-6. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 1 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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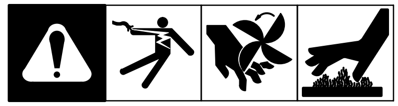
1-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*



Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

1-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-5. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



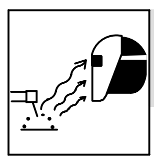
UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct – ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.

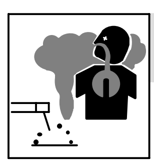
- Couper l'alimentation du poste et décharger les condensateurs d'entrée comme indiqué dans la Section Maintenance avant de toucher des composants.



LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (laine ou cuir) et une protection des pieds.



LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

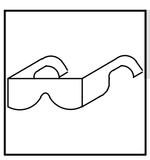
- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'interieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



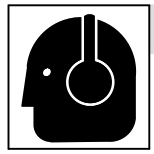
LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

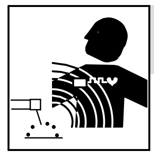
- Prévoir une période de refroidissement avant d'effectuer des travaux d'entretien.
- Porter des gants et des vêtements de protection pour travailler sur un moteur chaud.
- Ne pas toucher à mains nues les parties chaudes du moteur ni les pièces récemment soudées.



LE BRUIT peut affecter l'ouïe.

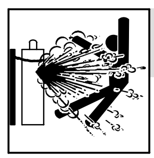
Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

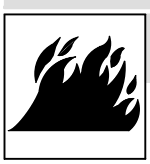


Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

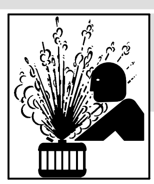
- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée − risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publication P-1 CGA énumérées dans les normes de sécurité.

1-3. Dangers existant en relation avec le moteur



LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l'espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.



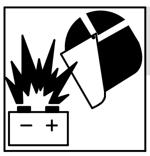
LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.
- Toujours vérifier le niveau de liquide de refroidissement dans le vase d'expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).
- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant :
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s'échapper avant d'enlever le bouchon.



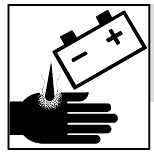
DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.
- Demander seulement à un personnel qualifié d'enlever les dispositifs de sécurité ou les recouvrements pour effectuer, s'il y a lieu, des travaux d'entretien et de dépannage.
- Pour empêcher tout démarrage accidentel pendant les travaux d'entretien, débrancher le câble négatif (–) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dipositifs de protection et fermer les portes à la fin des travaux d'entretien et avant de faire démarrer le moteur.
- Avant d'intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d'une intervention sur le générateur.



L'EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d'une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher les câbles de batterie.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser le poste de soudage pour charger les batteries ou des véhicules de démarrage rapide.
- Observer la polarité correcte (+ et –) sur les batteries.
- Débrancher le câble négatif (–) en premier lieu. Le rebrancher en dernier lieu.



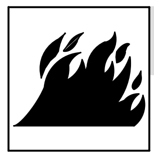
L'ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l'eau.



LES GAZ D'ÈCHAPPEMENT DU MOTEUR peuvent provoquer des accidents mortels.

- Utiliser l'équipement à l'extérieur dans des zones ouvertes et bien ventilées.
- En cas d'utilisation dans un endroit fermé évacuer les gaz d'échappement du moteur vers l'extérieur à distance des entrées d'air dans les bâtiments.



LA CHALEUR DU MOTEUR peut provoquer un incendie.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Tenir à distance les produits inflammables de l'échappement.



LES ÉTINCELLES À L'ÉCHAPPEMENT peuvent provoquer un incendie.

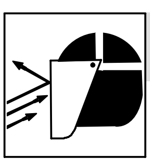
- Empêcher les étincelles d'échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé – voir codes en vigueur.

1-4. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



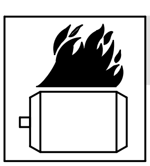
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil lui-même ; sans chariot, de bouteilles de gaz, remorque, ou autres accessoires.
- Utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



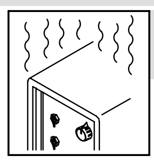
LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affuterr l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manoeuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie – éloigner toute substance inflammable.



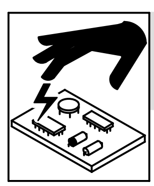
LE SURCHAUFFEMENT peut endommager le moteur électrique.

- Arrêter ou déconnecter l'équipement avant de démarrer ou d'arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d'endommager le moteur électrique à cause d'une tension et d'une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s'il y a lieu.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



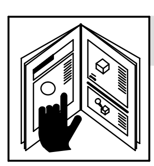
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.



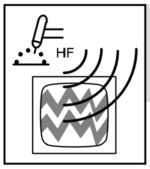
UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s'y rapportant.



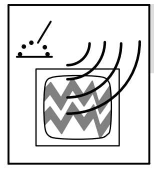
LIRE LES INSTRUCTIONS.

- Utiliser seulement les pièces de rechange d'origine.
- Effecteur la maintenance et la mise en service d'après le manuel et celui du moteur.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

1-5. Principales normes de sécurité

Safety in Welding and Cutting, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

Safety and Health Sandards, OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-6. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1. Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.
2. Mettre tous les câbles du côté opposé de l'opérateur.
3. Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.
4. Garder le poste de soudage et les câbles le plus loin possible de vous.
5. Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci−dessus.

SECTION 2 – DEFINITIONS

2-1. Symbols And Definitions

Symbol	Definition	Symbol	Definition	Symbol	Definition	Symbol	Definition
	Stop Engine		Fast (Run, Weld/ Power)		Slow (Idle)		Start Engine
	Starting Aid		Battery (Engine)		Engine Oil Pressure		Engine Oil
	Check Injectors/ Pump		Check Valve Clearance		Fuel		Protective Earth (Ground)
+	Positive	—	Negative		Certified/Trained Mechanic		Welding Arc
A	Amperes	V	Volts		Panel/Local		Remote
	Engine		Air Temperature Or Engine Temperature		Output		Alternating Current
	Stick (SMAW) Welding		Constant Current (CC)		MIG (GMAW) Welding		TIG (GTAW)
	Time	h	Hours	s	Seconds	1	Single Phase
3	Three Phase		Read Operator's Manual		Circuit Breaker		Do Not Switch While Welding
	Electrode Connection		Work Connection				

SECTION 3 – SPECIFICATIONS

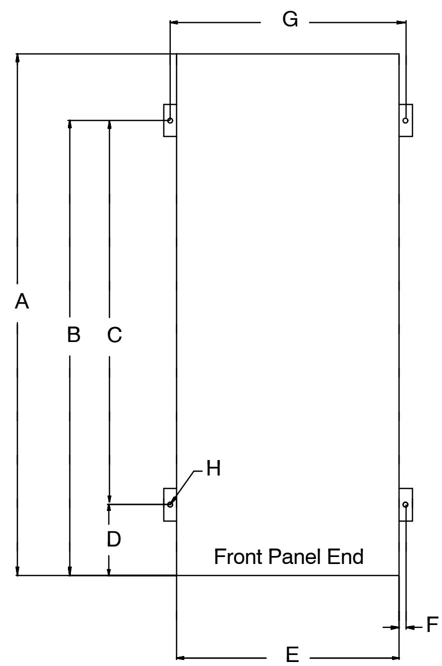
NOTE	*A CC/DC model is shown in this manual.*

3-1. Weld, Power, And Engine Specifications

Welding Mode	Weld Output Range	Rated Welding Output	Maximum Open-Circuit Voltage	Auxiliary Power Rating	Engine	Fuel Capacity
CC/DC	55 – 600 A (CC Models) 20 – 600 A (CC/CV Models)	400 A, 40 Volts DC, 100% Duty Cycle 500 A, 40 volts DC, 60% Duty Cycle 600 A, 30 Volts DC, 40% Duty Cycle	95	**Standard** Single-Phase, 4 kVA/kW, 34/17 A, 120/240 V AC, 50/60 Hz **Full kVA Option*** Single-Phase/Three-Phase, 12/20 kVA/kW, 50/48A, 120/240 VAC, 60 Hz *In Addition To Standard 4 kVA/kW Auxiliary Power	Perkins Perkins 3.1524 Water-Cooled, Three-Cylinder, 45 HP Diesel Engine	25 gal (95 L)
CV/DC (CC/CV Models Only)	14 – 40 V		56			

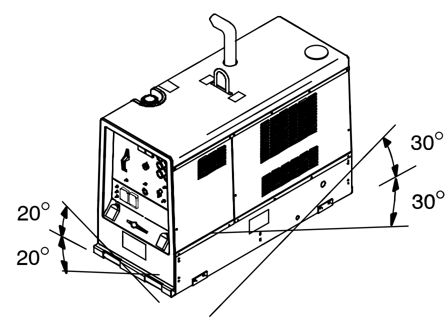
3-2. Dimensions, Weights, And Operating Angles

Dimensions	
Height	60 in (1524 mm) (to top of muffler)
Width	28-1/2 in (724 mm) (mtg. brackets turned in) 30-3/4 in (781 mm) (mtg. brackets turned out)
Depth	64-7/16 in (1637 mm)
A	64-7/16 in (1637 mm)
B	55-7/8 in (1419 mm)
C	46-3/8 in (1178)
D	9-1/2 in (241 mm)
E	27-1/2 in (699 mm)
F	1 in (25 mm)
G	29-1/2 in (743 mm)
H	9/16 in (14 mm) Dia. 4 Holes
Weight	
w/ Perkins 3.152	No fuel: 1670 lb (758 kg) w/fuel: 1860 lb (844 kg)



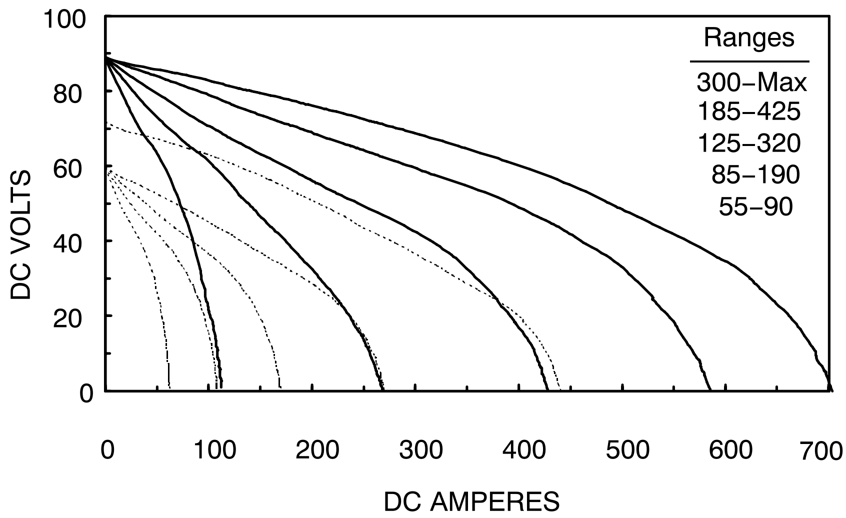
802 161-A

- ▲ **Do not exceed tilt angles or engine could be damaged or unit could tip.**
- ▲ **Do not move or operate unit where it could tip.**



3-3. Volt-Ampere Curves For CC Models

The volt-ampere curve shows the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of all other settings fall between the curves shown.

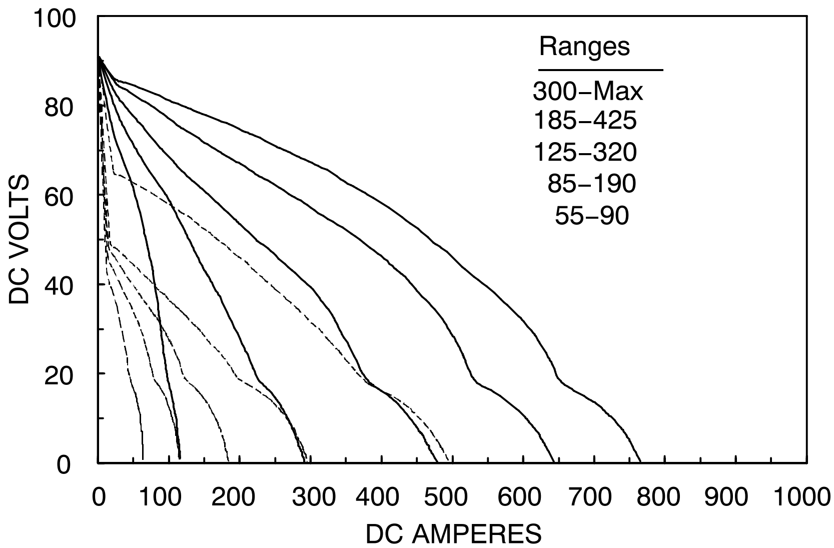


Ref. 193 017

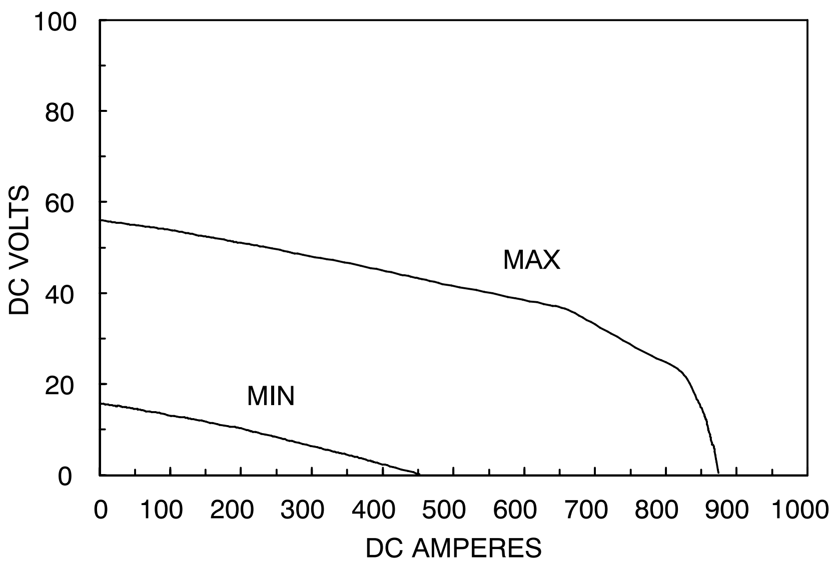
3-4. Volt-Ampere Curves for CC/CV Models

The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of all other settings fall between the curves shown.

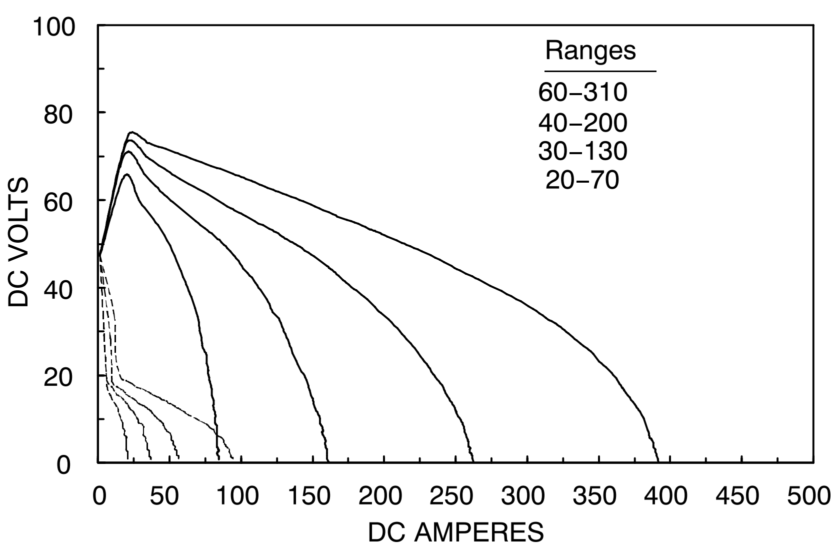
A. Stick Mode



B. MIG Mode



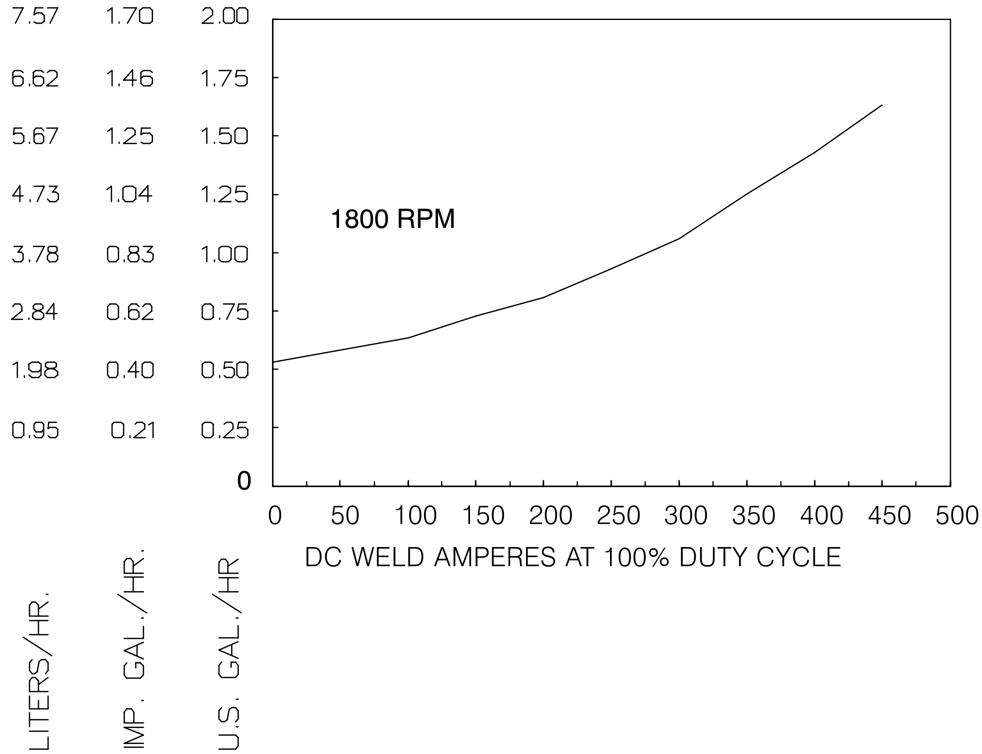
C. TIG Mode



194 364 / 194 365 / 194 366

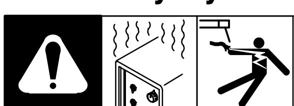
3-5. Fuel Consumption

The curve shows typical fuel use under weld or power loads.

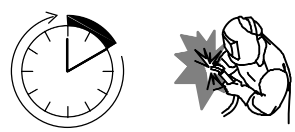


193 093

3-6. Duty Cycle And Overheating



100% Duty Cycle At 400 Amperes



Continuous Welding

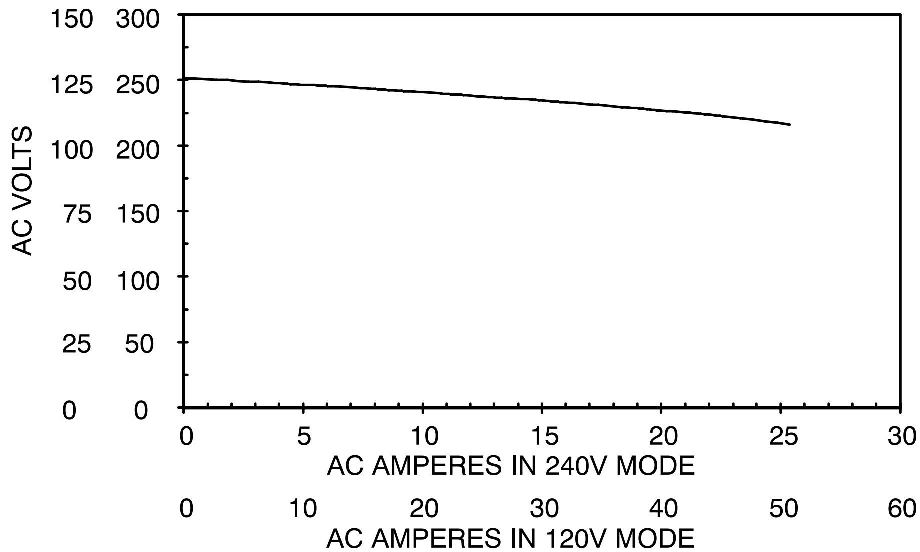
Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

▲ **Exceeding duty cycle can damage unit and void warranty.**



089 697-D

3-7. AC Auxiliary Power Curve



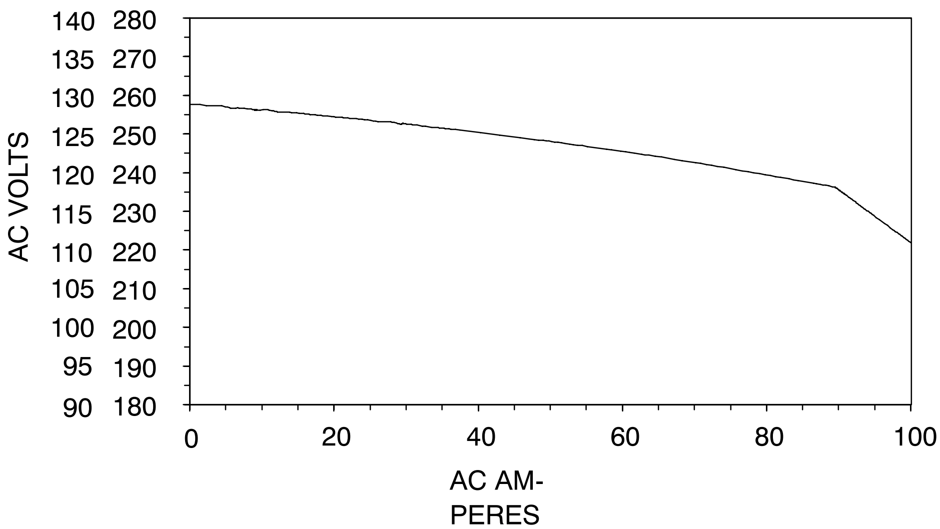
The ac power curve shows the auxiliary power in amperes available at the 120 and 240 volt receptacles.

193 018

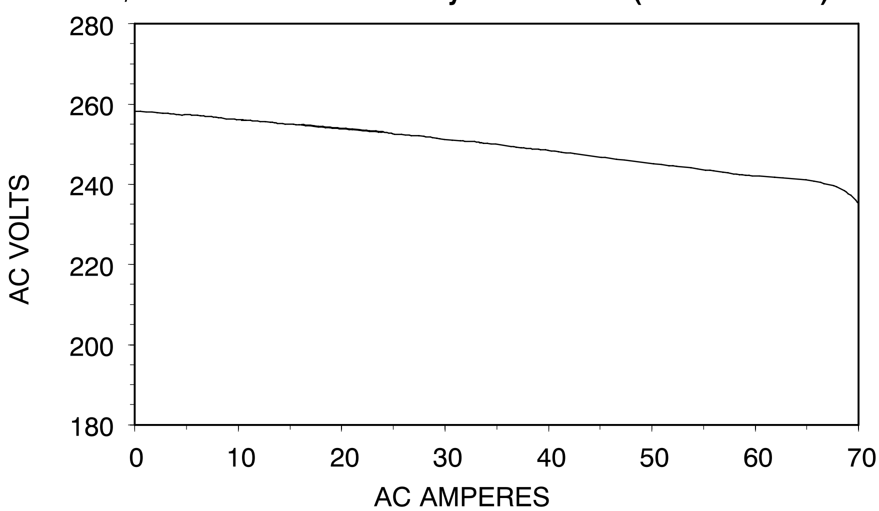
3-8. Optional AC Power Plant Curves

The ac power curves show the auxiliary power available in amperes at the single-phase 120/240 volt receptacle or three-phase 240 volt terminals.

A. 12 kVA/kW Single-Phase Auxiliary Power Plant (No Weld Load)



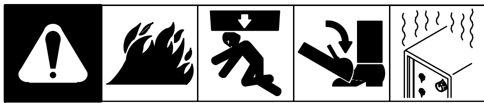
B. 20 kVA/kW Three-Phase Auxiliary Power Plant (No Weld Load)



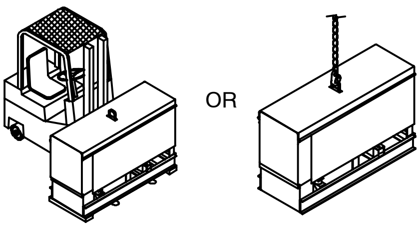
197 472 / 197 473

SECTION 4 – INSTALLATION

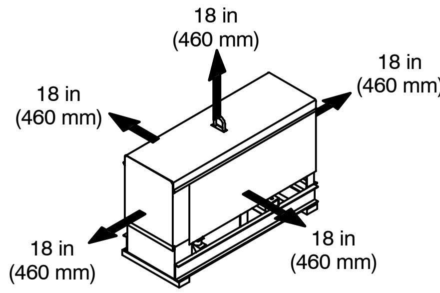
4-1. Installing Welding Generator (See Sections 4-2 And 4-3)



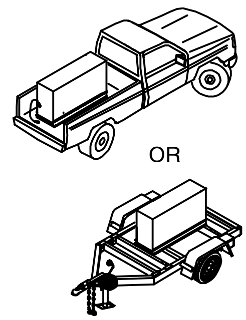
Movement



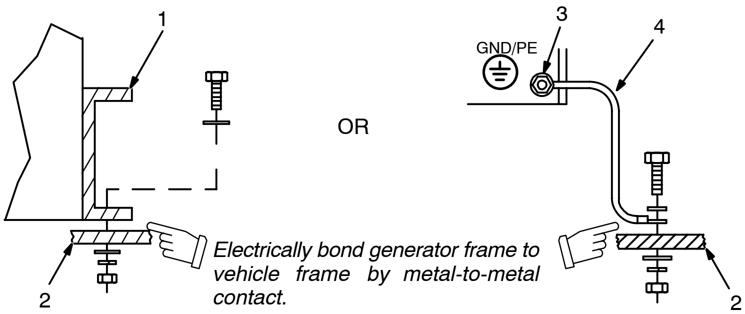
Airflow Clearance



Location



Grounding



▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

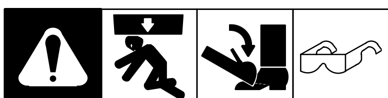
1 Generator Base
2 Metal Vehicle Frame
3 Equipment Grounding Terminal
4 Grounding Cable

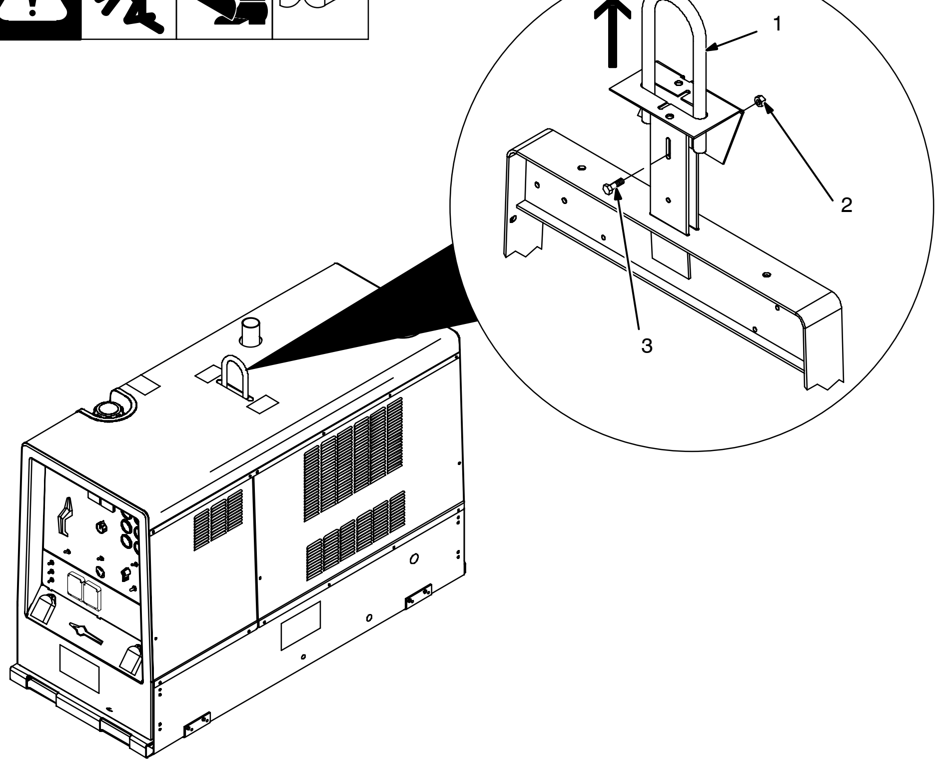
Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

install1 12/99* – Ref. 800 652 / Ref. 800 477-A / 158 936-A / 0854

4-2. Using Lifting Eye



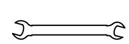


1 Lifting Eye
2 Nut
3 Carriage Bolt

Raise lifting eye until it snaps in place. Lower lifting eye when not needed.

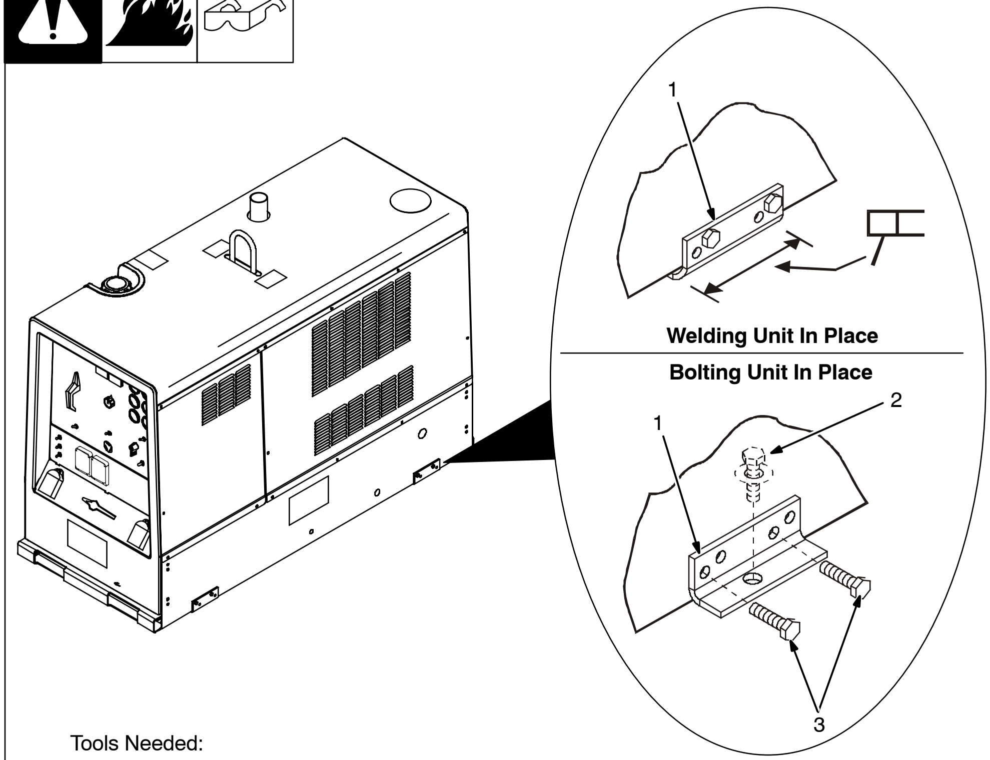
To lock the lifting eye in the upright position, insert a 1/4-20 x 1-1/2 in carriage bolt through slot in bracket and secure with nut (bolt and nut not supplied).

Tools Needed:



Ref. 802 169-C

4-3. Mounting Welding Generator



▲ **Do not weld on base. Welding on base can cause fuel tank fire or explosion. Weld only on the four mounting brackets or bolt unit down.**

1 Mounting Bracket

2 1/2 in Bolt And Washer (Not Supplied)

3 3/8-16 x 1 in Screws (Supplied)

To Bolt Unit In Place:

Remove hardware securing the four mounting brackets to the base. Reverse brackets and reattach to base with original hardware.

Mount unit to truck or trailer with 1/2 in (12 mm) hardware (not supplied).

To Weld Unit In Place:

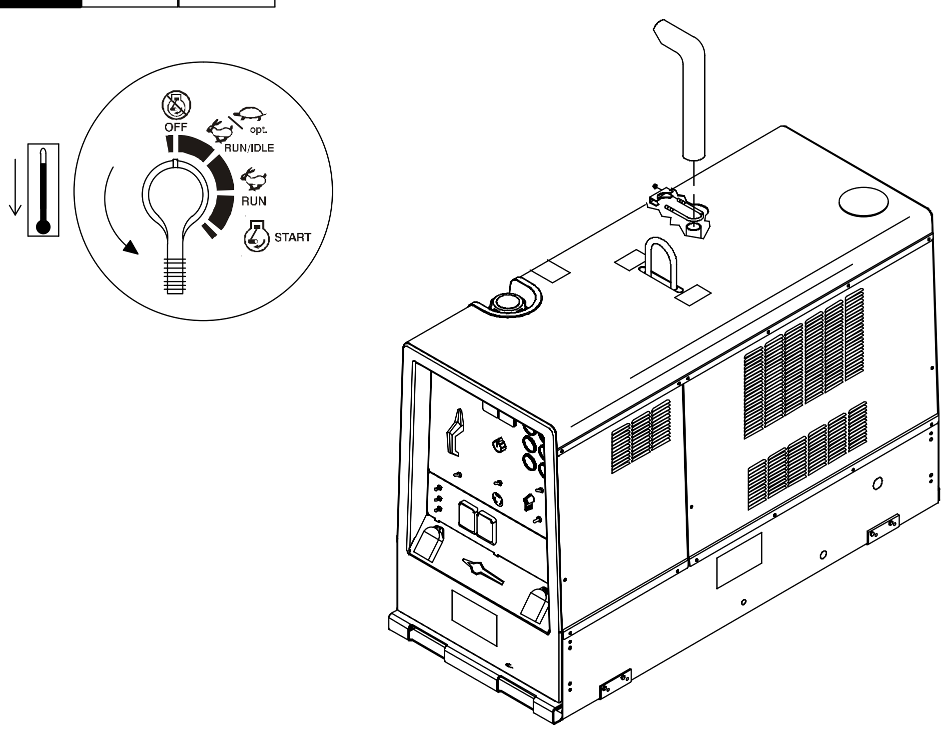
Weld unit to truck or trailer only at the four mounting brackets.

Tools Needed:

9/16 in

Ref. 190 250-A / Ref. 802 169-C

4-4. Installing Muffler



▲ **Stop engine and let cool.**

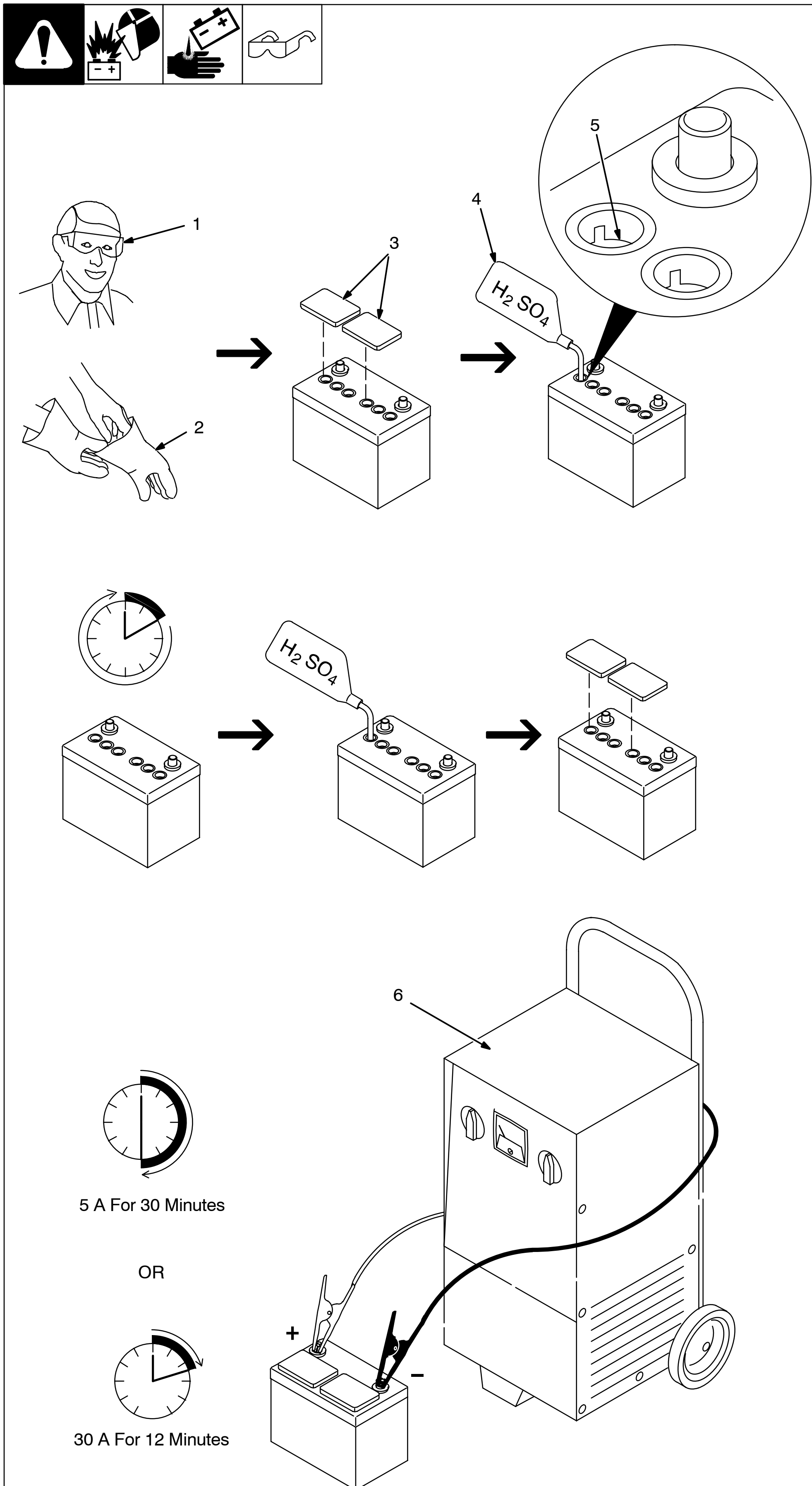
▲ **Do not blow exhaust toward air intakes.**

Tools Needed:

1/2 in

Ref. 802 169-B / Ref. 191 631-C

4-5. Activating The Dry Charge Battery (If Applicable)



Remove battery from unit.

1 Eye Protection – Safety Glasses Or Face Shield
2 Rubber Gloves
3 Vent Caps
4 Sulfuric Acid Electrolyte (1.265 Specific Gravity)
5 Well

Fill each cell with electrolyte to **bottom** of well (maximum).

▲ **Do not overfill battery cells.**

Wait ten minutes and check electrolyte level. If necessary, add electrolyte to raise to proper level. Reinstall vent caps.

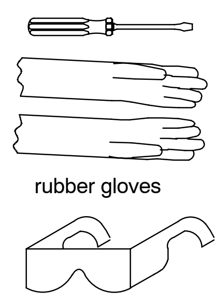
6 Battery Charger

▲ **Read and follow all instructions supplied with battery charger.**

Charge battery for 12 minutes at 30 amperes or 30 minutes at 5 amperes. Disconnect charging cables and install battery.

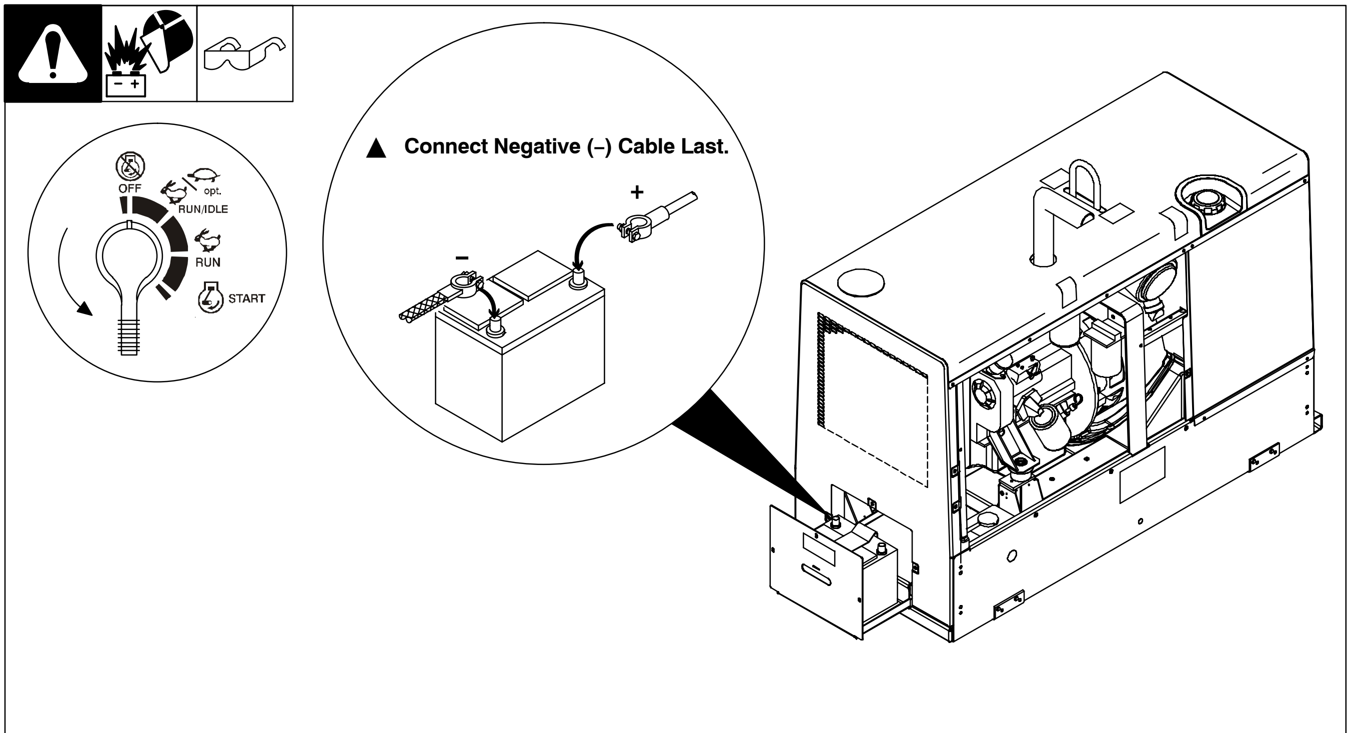
☞ *When electrolyte is low, add only distilled water to cells to maintain proper level.*

Tools Needed:



drybatt1 1/98 – 0886

4-6. Connecting The Battery



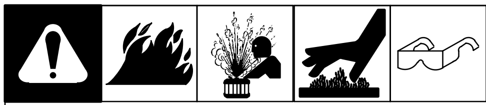
Tools Needed:

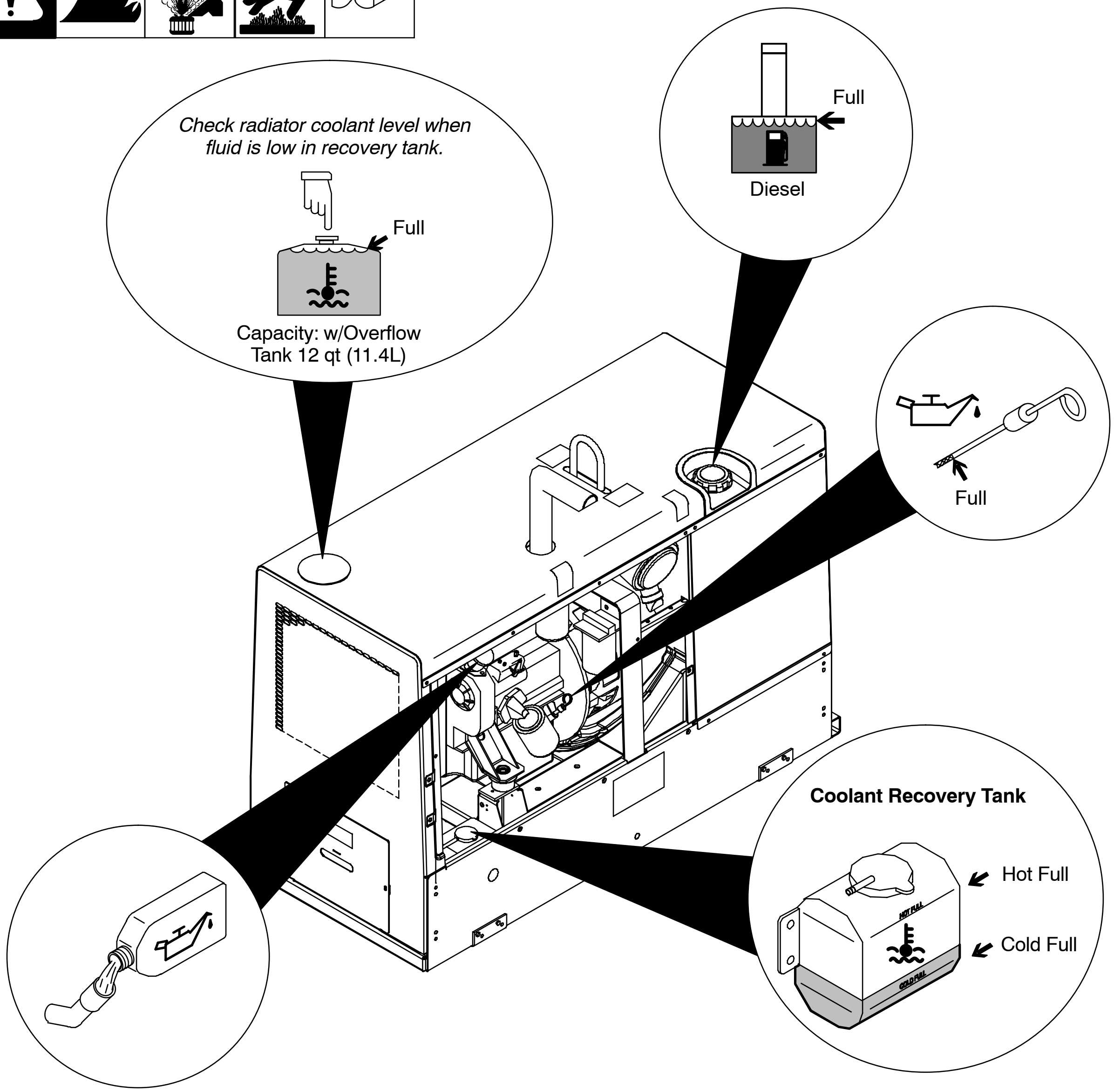
1/2 in

ST-802 168-D / Ref. ST-191 631-C / S-0756-C

Notes

4-7. Engine Prestart Checks





Ref. 802 168-C

☞ *Check all engine fluids daily.*

Engine must be cold and on a level surface. Unit is shipped with 20W break-in oil. The Automatic shutdown system stops engine if fuel level or oil pressure is too low, or coolant temperature is too high.

☞ *This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.*

Follow run-in procedure in engine manual. If unburned fuel and oil collect in exhaust pipe during run-in, see Section 10.

Fuel

▲ **Do not use gasoline. Gasoline will damage engine.**

The unit is shipped with enough fuel to prevent air from entering fuel system but not enough fuel to prevent low fuel shutdown. Add fresh diesel fuel before starting to prevent low fuel shutdown (see engine maintenance label for fuel specifications).

Do not run out of fuel or air will enter fuel system and cause starting problems. See engine manual to bleed air from fuel system.

Oil

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see maintenance label).

Coolant

Check coolant level in radiator before starting unit the first time. If necessary, add coolant to radiator until coolant level is at bottom of filler neck.

Check coolant level in recovery tank daily. If necessary, add coolant to recovery tank until coolant level is between Cold Full and Hot Full levels. If recovery tank coolant level was low, also check coolant level in radiator. Add coolant if level is below bottom of radiator filler neck.

Engine coolant is a mixture of water and ethylene glycol base antifreeze. Add antifreeze to mixture if using the unit in temperatures below −34° F (−37° C).

Keep radiator and air intake clean and free of dirt.

▲ **Incorrect engine temperature can damage engine. Do not run engine without a properly working thermostat and radiator cap.**

☞ *To improve cold weather starting:*

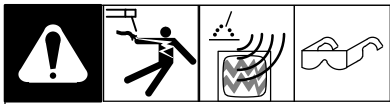
Use Starting Aid switch (see Section 5-1 or 6-1).

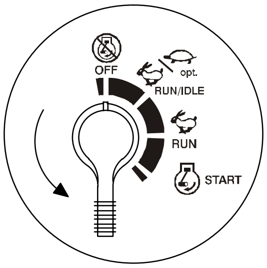
Keep battery in good condition. Store battery in warm area off concrete surface.

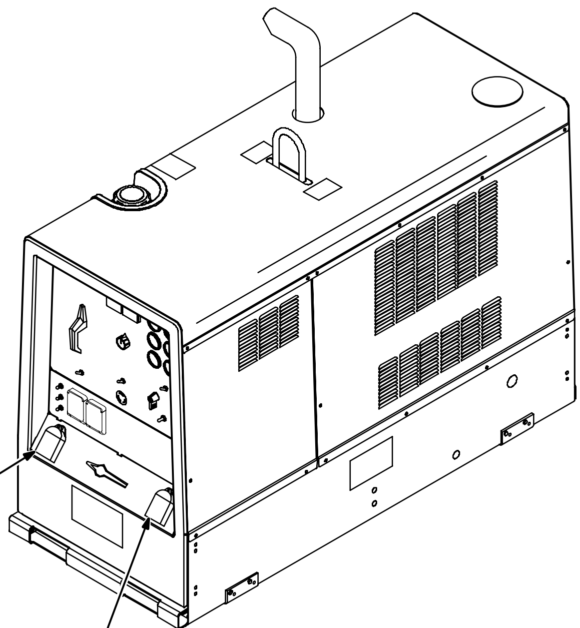
Use fuel formulated for cold weather (diesel fuel can gel in cold weather). Contact local fuel supplier for fuel information.

Use correct grade oil for cold weather (see Section 8-2).

4-8. Connecting To Weld Output Terminals







1

2

Tools Needed:

3/4 in

▲ **Stop engine.**

1 Positive (+) Weld Output Terminal

2 Negative (−) Weld Output Terminal

For Stick and TIG welding Direct Current Electrode Positive (DCEP), connect electrode holder cable to Positive (+) terminal on left and work cable to Negative (−) terminal on right.

For Direct Current Electrode Negative (DCEN), reverse cable connections.

If equipped with optional polarity switch, connect electrode holder cable to Electrode terminal on left and work cable to Work terminal on right.

For MIG and FCAW welding Direct Current Electrode Positive (DCEP) on CC/CV models, connect wire feeder cable to Positive (+) terminal on left and work cable to Negative (−) terminal on right. Use Process/Contactor switch to select type of weld output (see Section 6-3).

For Direct Current Electrode Negative (DCEN), reverse cable connections.

If equipped with optional polarity switch, connect wire feeder cable to Electrode terminal on left and work cable to Work terminal on right.

Ref. 802 169-C

4-9. Selecting Weld Cable Sizes

Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding							
	100 ft (30 m) Or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 − 60% Duty Cycle	60 − 100% Duty Cycle	10 − 100% Duty Cycle					
100	4	4	4	3	2	1	1/0	1/0
150	3	3	2	1	1/0	2/0	3/0	3/0
200	3	2	1	1/0	2/0	3/0	4/0	4/0
250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0
300	1	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0
350	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0	2-4/0
400	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	2-4/0
500	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-3/0

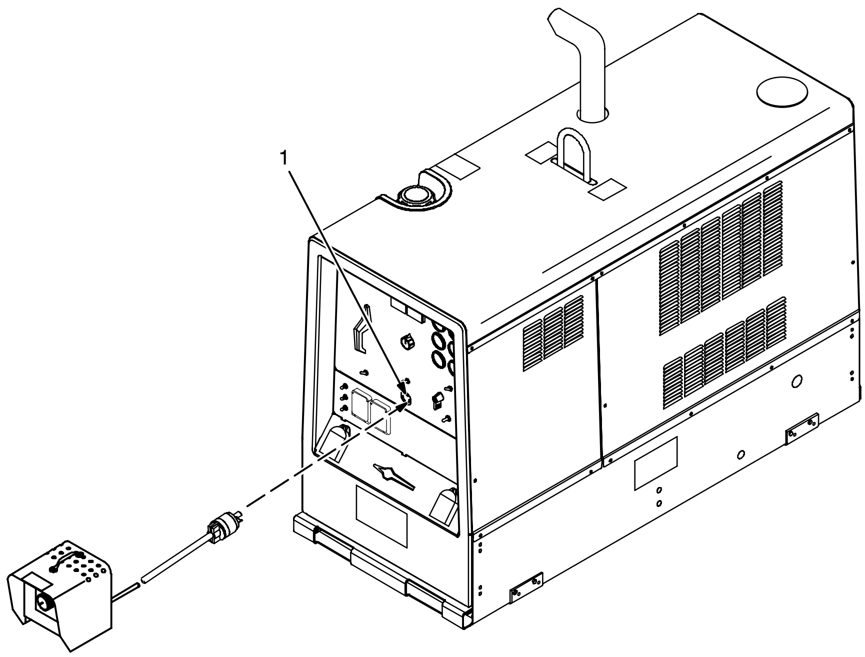
*Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere. Contact your distributor for the mm^2 equivalent weld cable sizes.

S-0007-E

4-10. Connecting To Remote Amperage Adjust Receptacle RC13 On CC Models

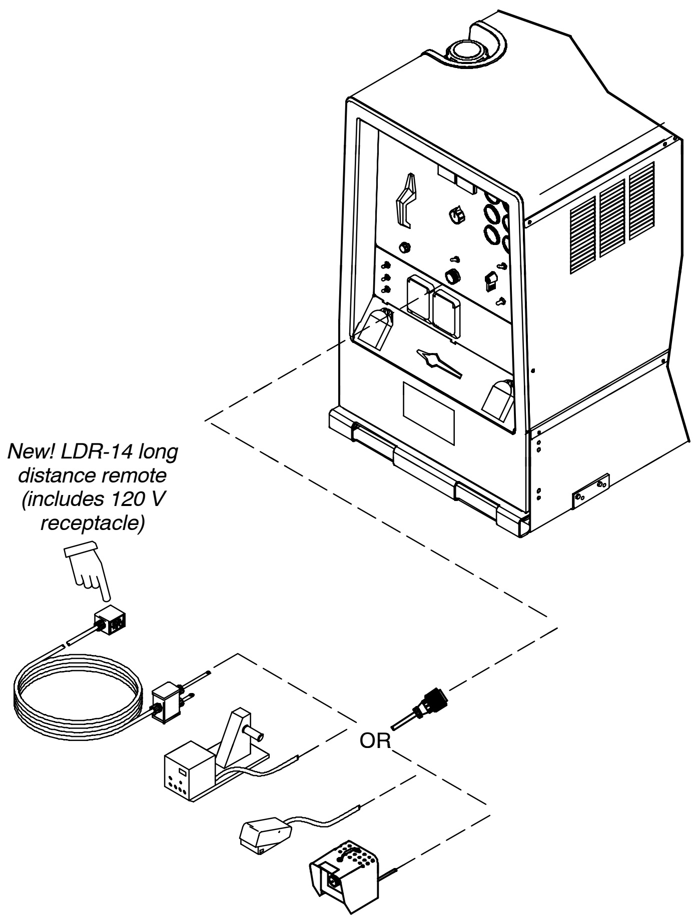
1 Remote Amperage Adjust Receptacle RC13

Connect optional remote control to RC13 (see Section 5-3).



Ref. 154 862-A / 048 720-K / 802 160-B

4-11. Connecting To Remote 14 Receptacle RC14 On CC/CV Models

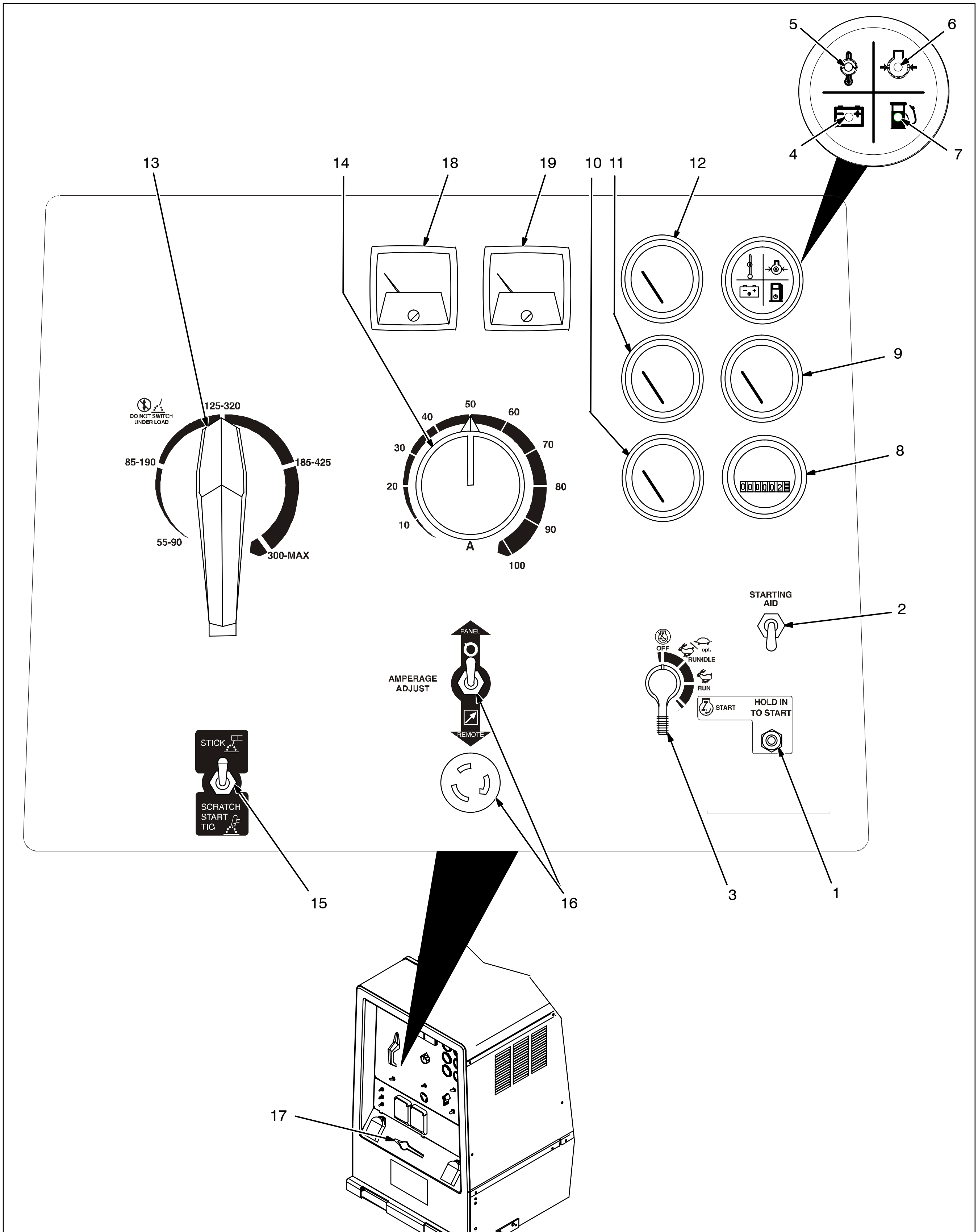


REMOTE 14	Socket*	Socket Information
24 VOLTS AC OUTPUT (CONTACTOR)	A	24 volts ac. Protected by circuit breaker CB6.
	B	Contact closure to A completes 24 volt ac contactor control circuit.
REMOTE OUTPUT CONTROL	C	Output to remote control:+10 volts dc in MIG or Stick mode; 0 to +10 volts dc in TIG mode.
	D	Remote control circuit common.
	E	DC input command signal: 0 to +10 volts from min. to max. of remote control with Voltage/ Amperage Adjust control at max.
115 VOLTS AC OUTPUT (CONTACTOR)	I	115 volts, 10 amperes, 60 Hz ac. Protected by circuit breaker CB6.
	J	Contact closure to I completes 115 volt ac contactor control circuit.
GND	K	Chassis common.
NEUTRAL	G	Circuit common for 24 and 115 volt ac circuit.

*The remaining sockets are not used.

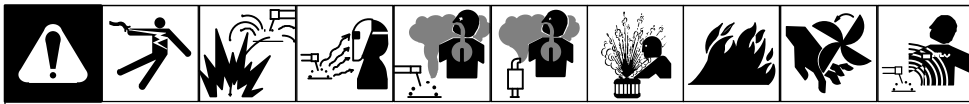
SECTION 5 – OPERATING WELDING GENERATOR – CC MODELS

5-1. Front Panel Controls For CC Models (See Section 5-2)



191 631-C / 802 311-A

5-2. Description Of Front Panel Controls For CC Models (See Section 5-1)



Engine Starting Controls

1 Magnetic Shutdown Switch

Use switch during start-up to bypass engine shutdown system. System stops engine if oil pressure or fuel level is too low or coolant temperature is too high.

2 Starting Aid Switch

Use switch to energize starting aid for cold weather starting (see starting instructions following).

3 Engine Control Switch

Use switch to start engine, select engine speed (if unit has auto idle option), and stop engine.

In Run position, engine runs at weld/power speed. In Run/Idle position (optional), engine runs at idle speed at no load and weld speed with load applied.

To Start:

☞ *If engine does not start, let engine come to a complete stop before attempting restart.*

Above 32° F (0° C): turn Engine Control switch to Start while pressing Shutdown switch. Release Engine Control switch when engine starts. Continue holding Shutdown switch until engine indicator lights go out.

Below 32° F (0° C): turn engine control switch to Run/Idle position. Push Starting Aid switch up for 60 seconds. While still holding Starting Aid switch, press Magnetic Shutdown switch and turn Engine Control switch to Start. Release Engine Control switch and Starting Aid switch when engine starts. Continue holding Shutdown switch until engine indicator lights go out.

To Stop: turn Engine Control switch to Off position.

Engine Indicator Lights

4 Battery Charging Light

Light goes on if engine alternator is not charging battery. Engine continues to run.

▲ **Stop engine and fix trouble if Battery Charging light goes on.**

5 Engine Temperature Light

Light goes on and engine stops if engine temperature is above 221 ° F (105° C).

▲ **Stop engine and fix trouble if Engine Temperature light goes on.**

6 Engine Oil Pressure Light

Light goes on and engine stops if oil pressure is below 10 psi (69 kPa). Light goes on momentarily during start-up but goes out when engine reaches normal oil pressure.

▲ **Stop engine and fix trouble if Engine Oil Pressure light stays on after start-up.**

7 Fuel Light

Light goes on and engine stops if fuel level is low. Add fuel to resume operation.

8 Engine Hour Meter

Engine Gauges

☞ *To read gauges and engine indicator lights with engine off, turn Engine Control switch to Run/Idle and press Magnetic Shutdown switch (see Section 8-8).*

9 Fuel Gauge

Use gauge to check fuel level.

To check fuel level when engine is not running, turn Engine Control switch to Run/Idle position and press Magnetic Shutdown switch.

10 Battery Voltmeter (Optional)

Use gauge to check battery voltage and monitor the engine charging system. The meter should read about 14 volts dc when the engine is running, and about 12 volts dc when the engine is stopped.

11 Engine Coolant Temperature Gauge (Optional)

Normal temperature is 180 - 203° F (82 - 95° C). When equipped with gauge option, engine stops if temperature exceeds 220° F (104° C).

12 Engine Oil Pressure Gauge (Optional)

Normal pressure is 30 – 60 psi (207 – 414 kPa). When equipped with gauge option, engine stops if pressure is below 10 psi (69 kPa).

Weld Controls

☞ ***Max OCV Control Circuit:*** *This unit has a max OCV control circuit that resets Amperage Adjust control R1 to maximum when the arc breaks. When an arc is struck, weld output control returns to the R1 front panel or combination front panel/ remote control setting. The Amperage Adjust control adjusts amperage only when welding and does not adjust open-circuit voltage.*

The max OCV circuit is disabled when the Stick/TIG Selection switch is in Scratch Start TIG position (see item 15).

13 Ampere Range Switch

▲ **Do not switch under load.**

Use switch to select weld amperage range. For most welding applications, use lowest amperage range possible to help prevent arc outages.

14 Amperage Adjust Control

Control adjusts amperage within range selected by Ampere Range switch. Weld output would be about 223 A DC with controls set as shown (50% of 125 to 320 A).

☞ *The numbers around the control are for reference only and do not represent an actual percentage value.*

15 Stick/TIG Selection Switch

Use switch to disable max OCV circuit for scratch start TIG welding (see max OCV note under Weld Controls). When switch is in Stick position, the max OCV circuit resets Amperage Adjust Control R1 to maximum when the arc breaks. When switch is in Scratch Start TIG position, max OCV circuit is disabled and OCV changes when the control is adjusted.

16 Amperage Adjust Switch And Remote Amperage Adjust Receptacle

Connect optional remote control to RC13 (See Section 4-10). Use switch to select front panel or remote amperage control. For remote control, place switch in Remote position and connect remote control to Remote Amperage Adjust receptacle RC13 (see Sections 4-10 and 5-3).

17 Polarity Switch (Optional)

▲ **Do not switch under load.**

Use switch to change weld output. Select either DC Electrode Positive (DCEP) or DC Electrode Negative (DCEN).

Weld Meters

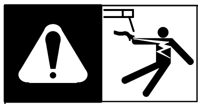
18 DC Voltmeter (Optional)

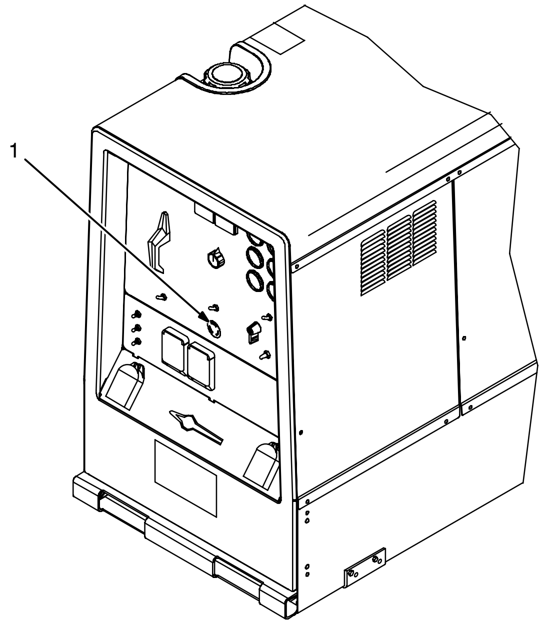
Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to resistance of cable and connections.

19 DC Ammeter (Optional)

Ammeter displays amperage output of the unit.

5-3. Remote Amperage Control On CC Models (Optional)



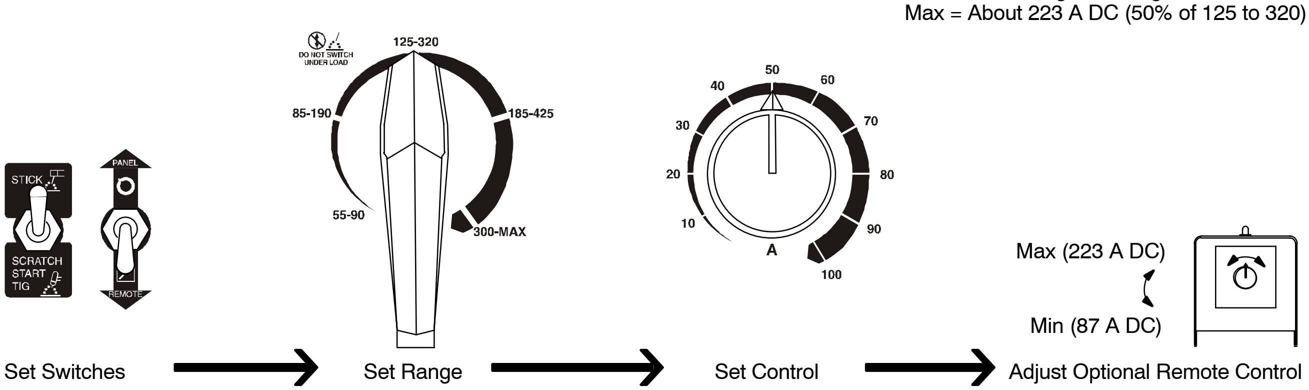


1 Remote Amperage Adjust Receptacle RC13

Connect optional remote control to RC13 (see Section 4-10).

Example: Combination Remote Amperage Control (Stick)

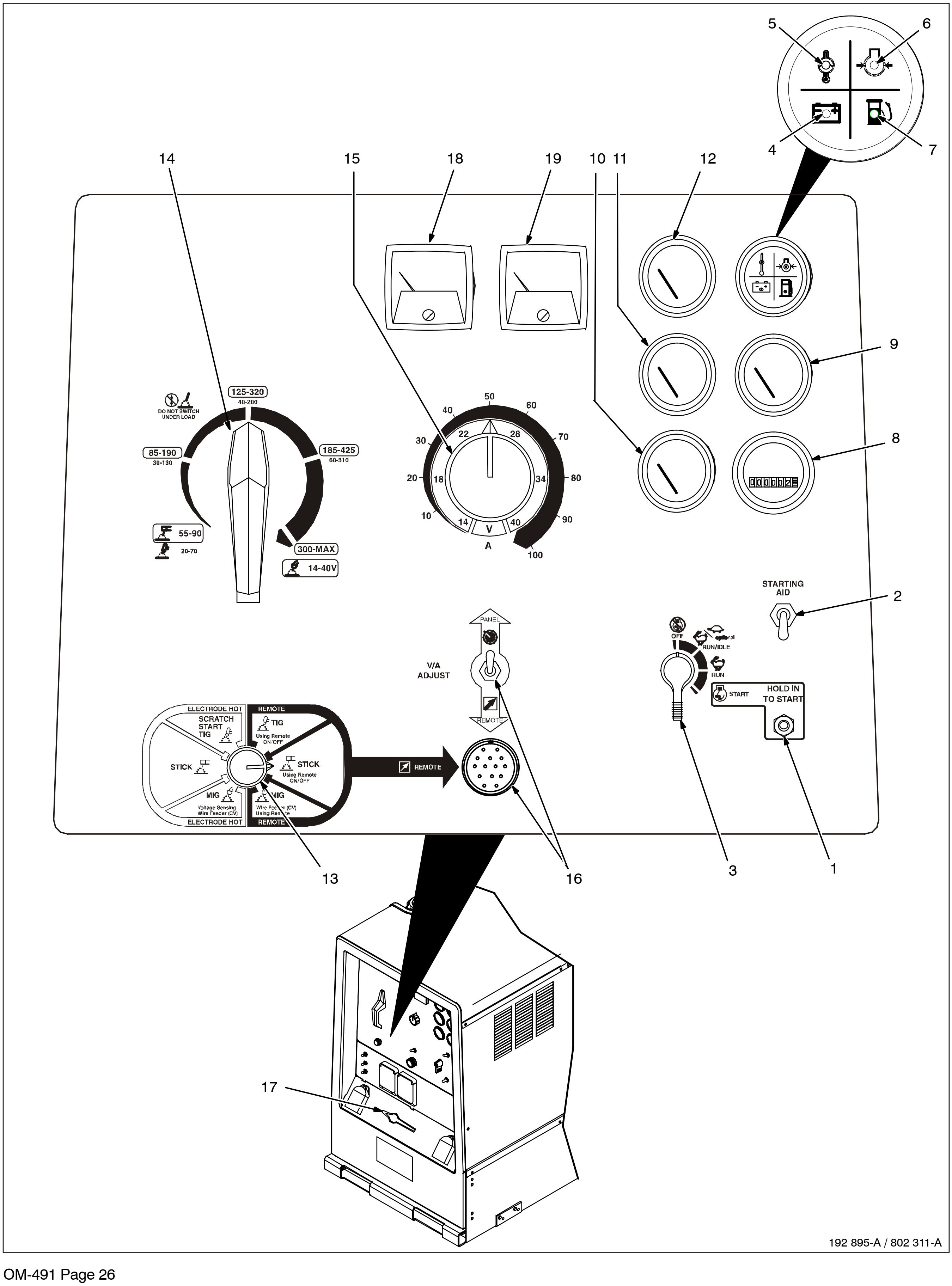
In Example:
Range = 125 to 320 A DC
Percentage Of Range = 50%
Max = About 223 A DC (50% of 125 to 320)



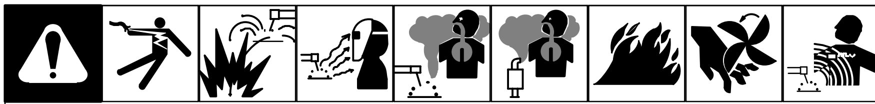
0774 / Ref. 154 862-A / Ref. 181 711-A / 802 160-B

SECTION 6 – OPERATING WELDING GENERATOR – CC/CV MODELS

6-1. Front Panel Controls For CC/CV Models (See Section 6-2)



6-2. Description Of Front Panel Controls For CC/CV Models (See Section 6-1)



Engine Starting Controls

1 Magnetic Shutdown Switch

Use switch during start-up to bypass engine shutdown system. System stops engine if oil pressure is too low or engine temperature is too high.

2 Starting Aid Switch

Use switch to energize starting aid for cold weather starting (see starting instructions following).

3 Engine Control Switch

Use switch to start engine, select engine speed (if unit has auto idle option), and stop engine.

In Run position, engine runs at weld/power speed. In Run/Idle position (optional), engine runs at idle speed at no load and weld speed with load applied. Turn to run position if using optional auxiliary power plant (see Section 7-2).

To Start:

☞ *If engine does not start, let engine come to a complete stop before attempting restart.*

Above 32° F (0° C): turn Engine Control switch to Start while pressing Shutdown switch. Release Engine Control switch when engine starts. Continue holding Shutdown switch until engine indicator lights go out.

Below 32° F (0° C): turn engine control switch to Run/Idle position. Push Starting Aid switch up for 60 seconds. While still holding Starting Aid switch, press Magnetic Shutdown switch and turn Engine Control switch to Start. Release Engine Control switch and Starting Aid switch when engine starts. Continue holding Shutdown switch until engine indicator lights go out.

To Stop: turn Engine Control switch to Off position.

Engine Indicator Lights

4 Battery Charging Light

Light goes on if engine alternator is not charging battery. Engine continues to run.

▲ **Stop engine and fix trouble if Battery Charging light goes on.**

5 Engine Temperature Light

Light goes on and engine stops if engine temperature is above 221 ° F (105° C).

▲ **Stop engine and fix trouble if Engine Temperature light goes on.**

6 Engine Oil Pressure Light

Light goes on and engine stops if oil pressure is below 10 psi (69 kPa). Light goes on momentarily during start-up but goes out when engine reaches normal oil pressure.

▲ **Stop engine and fix trouble if Engine Oil Pressure light stays on after start-up.**

7 Fuel Light

Light goes on and engine stops if fuel level is low. Add fuel to resume operation.

8 Engine Hour Meter

Engine Gauges

☞ *To read gauges and engine indicator lights with engine off, turn Engine Control switch to Run/Idle and press Magnetic Shutdown switch (see Section 8-8).*

9 Fuel Gauge

Use gauge to check fuel level.

To check fuel level when engine is not running, turn Engine Control switch to Run/Idle position and press Magnetic Shutdown switch.

10 Battery Voltmeter (Optional)

Use gauge to check battery voltage and monitor the engine charging system. The meter should read about 14 volts dc when the engine is running, and about 12 volts dc when the engine is stopped.

11 Engine Coolant Temperature Gauge (Optional)

Normal temperature is 180 - 203° F (82 - 95° C). When equipped with gauge option, engine stops if temperature exceeds 220° F (104° C).

12 Engine Oil Pressure Gauge (Optional)

Normal pressure is 30 − 60 psi (207 − 414 kPa). When equipped with gauge option, engine stops if pressure is below 10 psi (69 kPa).

Weld Controls

13 Process/Contactor Switch

See Section 6-3 for Process/Contactor switch information.

14 Ampere Range Switch

▲ **Do not switch under load.**

Use switch to select weld amperage range.

Use any range for Stick welding. Read the upper set of numbers at each range.

Use the lower four ranges for TIG welding. Read the lower set of numbers at each range.

Use the highest range for MIG welding and for cutting and gouging (CAC-A).

For most welding applications, use lowest amperage range possible to help prevent arc outages.

15 Voltage/Amperage Adjust Control

With Process/Contactor switch in any Stick or TIG setting, use control to adjust amperage within range selected by Ampere Range switch. With Process/Contactor switch in any MIG position, use control to adjust voltage. With Voltage/Amperage Adjust Switch in Remote position, control limits the remote amperage in TIG mode, but has no effect in Stick and MIG modes.

☞ *The numbers around the control are for reference only and do not represent an actual percentage value.*

16 Voltage/Amperage Adjust Switch And Remote 14 Receptacle

Use switch to select front panel or remote voltage/amperage control. For remote control, place switch in Remote position and connect remote control to Remote 14 receptacle RC14 (see Sections 4-11 and 6-4).

17 Polarity Switch (Optional)

▲ **Do not switch under load.**

Use switch to change weld output. Select either DC Electrode Positive (DCEP) or DC Electrode Negative (DCEN).

Weld Meters

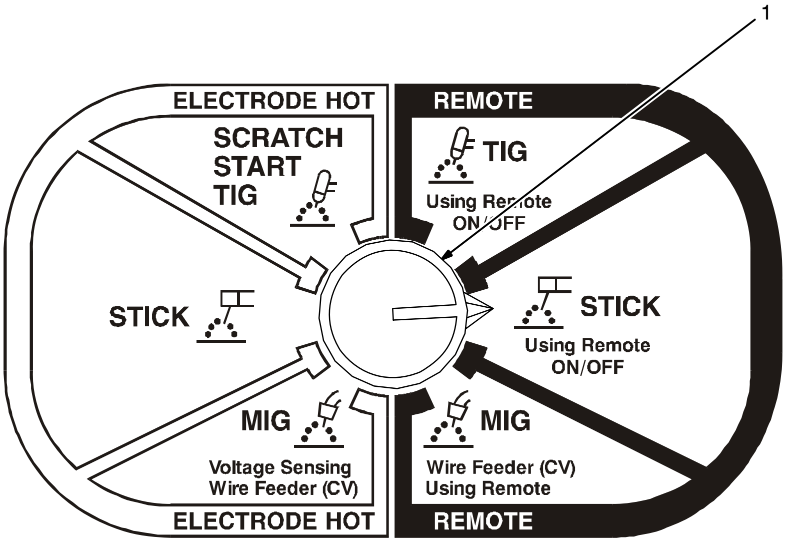
18 DC Voltmeter (Optional)

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to resistance of cable and connections.

19 DC Ammeter (Optional)

Ammeter displays amperage output of the unit.

6-3. Process/Contactor Switch On CC/CV Models



1 Process/Contactor Switch

▲ **Weld output terminals are energized when Process/Contactor switch is in an Electrode Hot position and the engine is running.**

Use switch to select weld process and weld output on/off control (see table below and Section 6-4).

Place switch in Remote positions to turn weld output on and off with a device connected to the remote 14 receptacle.

Place switch in Electrode Hot positions for weld output to be on whenever the engine is running.

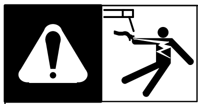
Use Stick position for air carbon arc (CAC-A) cutting and gouging.

☞ *Place switch in Electrode Hot - Stick position when using optional auxiliary power plant (see Section 7-2).*

Process/Contactor Switch Settings

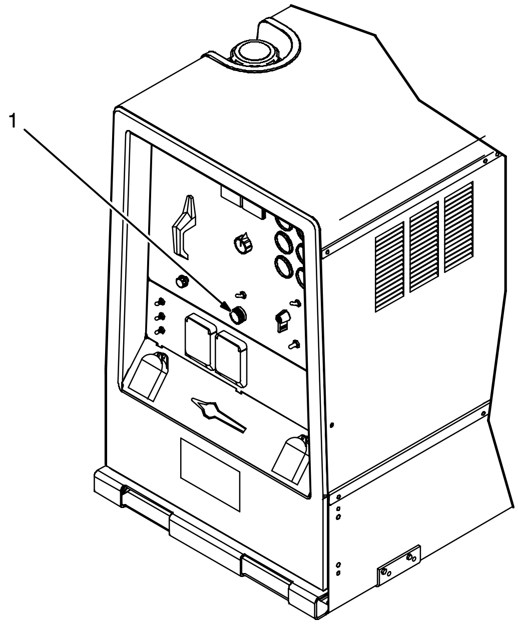
Switch Setting	Process	Output On/Off Control
Remote − TIG	GTAW With HF Unit, Pulsing Device, Or Remote Control	At Remote 14 Receptacle
Remote − Stick	Stick (SMAW) With Remote On/Off	At Remote 14 Receptacle
Remote − MIG	MIG (GMAW)	At Remote 14 Receptacle
Electrode Hot − MIG	MIG (GMAW)	Electrode Hot
Electrode Hot − Stick	Stick (SMAW), Air Carbon Arc (CAC-A) Cutting And Gouging	Electrode Hot
Electrode Hot − Scratch Start TIG	Scratch Start TIG (GTAW)	Electrode Hot

6-4. Remote Voltage/Amperage Control On CC/CV Models (Optional)



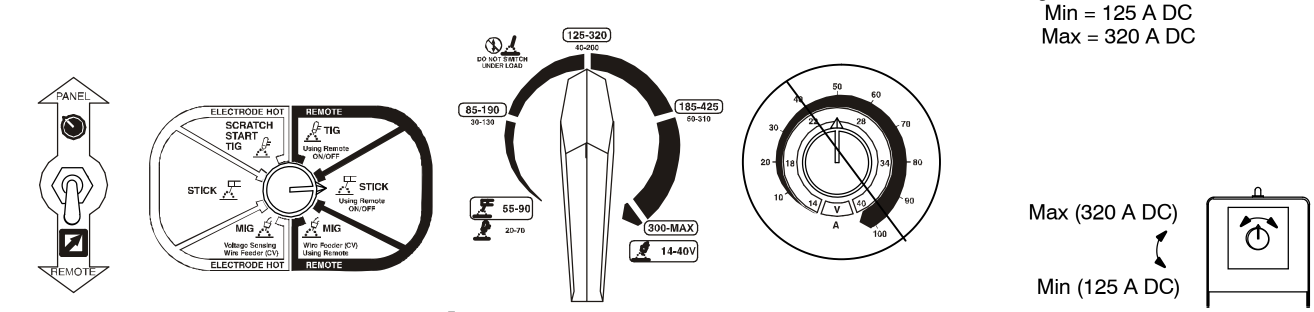
1 Remote 14 Receptacle RC14

Connect optional remote control to RC14 (see Section 4-11).



Example: Combination Remote Amperage Control (Stick)

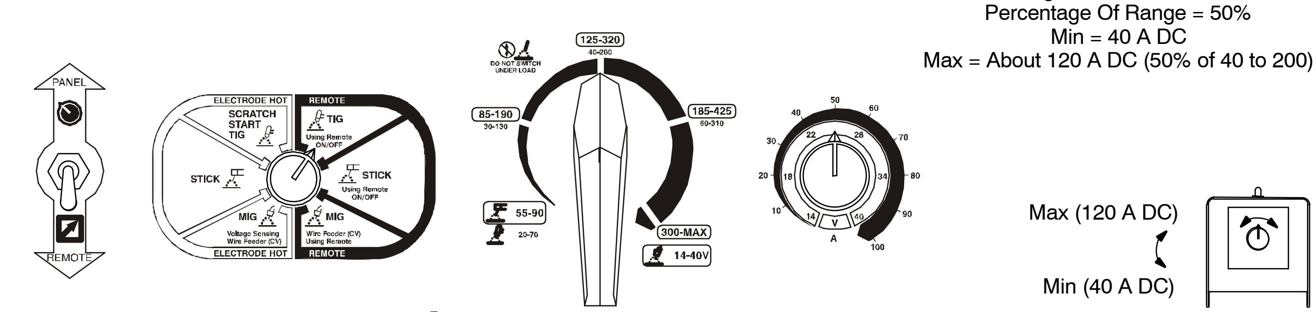
In Example:
Process = Stick (Using Remote On/Off)
Range = 125 to 320 A DC
Min = 125 A DC
Max = 320 A DC



Set V/A Adjust Switch → Set Remote Process → Set Range → Control Not Used In Remote Stick Mode → Adjust Optional Remote Control

Example: Combination Remote Amperage Control (TIG)

In Example:
Process = TIG (Using Remote On/Off)
Range = 40 to 200 A DC
Percentage Of Range = 50%
Min = 40 A DC
Max = About 120 A DC (50% of 40 to 200)



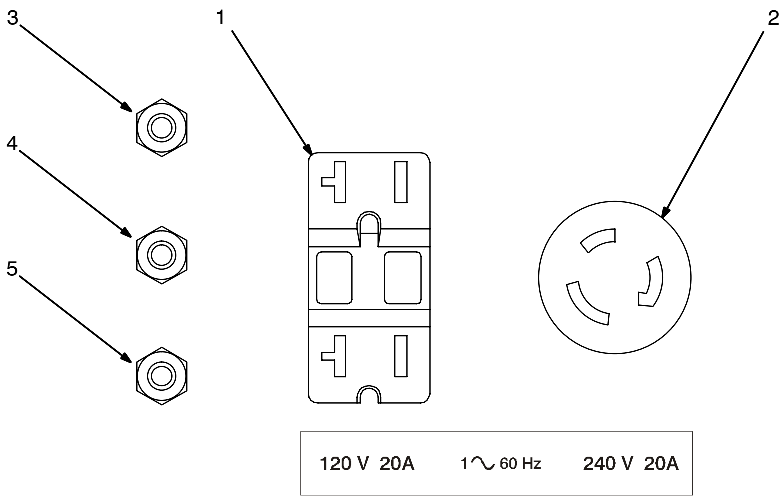
Set V/A Adjust Switch → Set Remote Process → Set Range → Set Control → Adjust Optional Remote Control

0774 / Ref. 192 895-A / 802 169-B

SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. 120 Volt And 240 Volt Receptacles





191 624-A

1 120 V 20 A AC GFCI Receptacle GFCI1

2 240 V 20 A AC Twistlock Receptacle RC1

Receptacles supply 60 Hz single-phase power at weld/power speed.

If a ground fault is detected, GFCI Reset button pops out and receptacle does not work. Check for faulty tools plugged in receptacle. Press button to reset GFCI1.

☞ *At least once a month, run engine at weld/power speed and press test button to verify GFCI is working properly.*

3 Circuit Breaker CB1

4 Circuit Breaker CB2

5 Circuit Breaker CB3

CB1 and CB3 protect RC1 from overload. If CB1 or CB3 opens, RC1 does not work. 120 volts may still be present at RC1. Press button to reset breaker.

CB2 protects GFCI1 from overload. If CB2 opens, GFCI1 does not work. Press button to reset breaker.

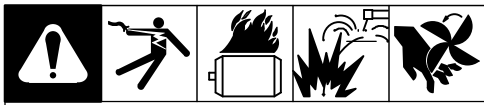
☞ *If a circuit breaker continues to open, contact Factory Authorized Service Agent.*

Maximum output is 2.4 kVA/kW from GFCI1 and 4 kVA/kW from RC1. Maximum output from all receptacles is 4 kVA/kW.

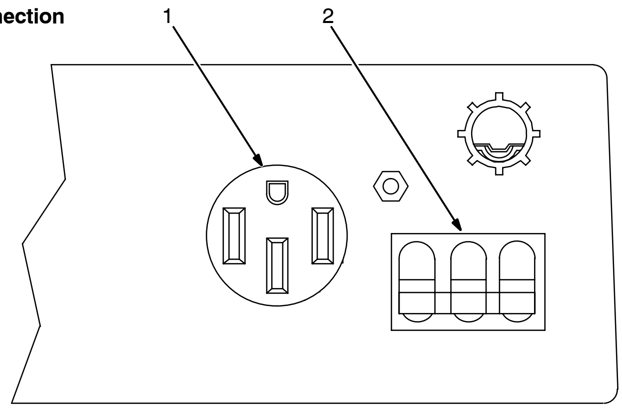
EXAMPLE: If 13 A is drawn from RC1, only 7 A is available at GFCI1:

(240 V x 13 A) + (120 V x 7 A) = 4.0 kVA/kW

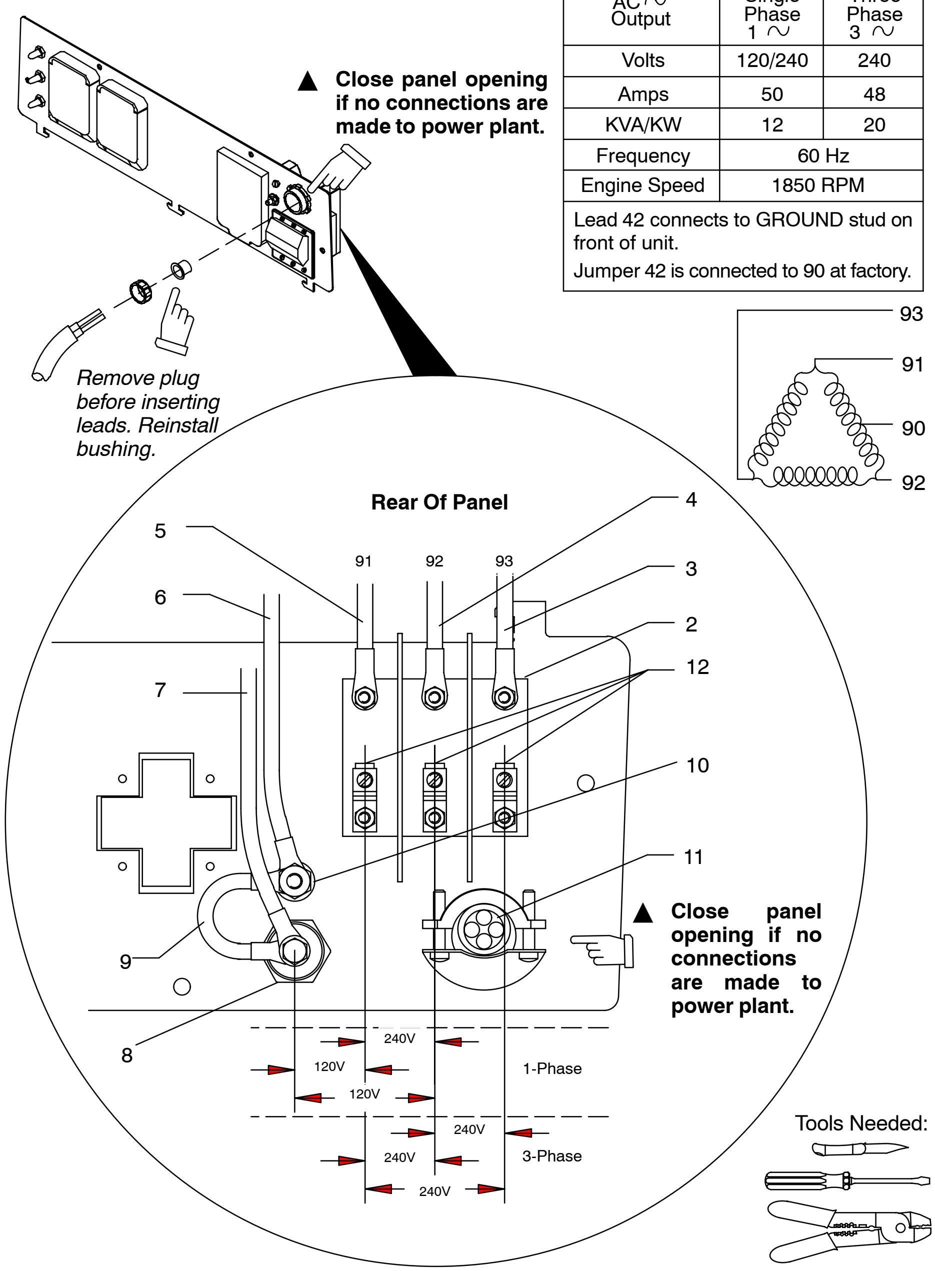
7-2. Connecting To Optional Auxiliary Power Plant (CC/CV Models Only)



Single-Phase Power Connection



Three-Phase Power Connection



AC ∿ Output	Single Phase 1 ∿	Three Phase 3 ∿
Volts	120/240	240
Amps	50	48
KVA/KW	12	20
Frequency	60 Hz	
Engine Speed	1850 RPM	

Lead 42 connects to GROUND stud on front of unit.

Jumper 42 is connected to 90 at factory.

Tools Needed:

☞ *Place Process/Contactor switch in Electrode Hot - Stick position when using auxiliary power plant (see Section 6-3).*

☞ *Place Engine Control switch in Run position when using auxiliary power plant.*

Single-Phase Auxiliary Power

1 120/240 V 50 A Receptacle RC5

RC5 is connected to the optional auxiliary power plant and supplies 60 Hz single-phase power at weld/power speed. Maximum output from RC5 is 12 kVA/kW. Power available at RC5 is reduced when welding.

2 Circuit Breaker CB7

Circuit breaker CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all auxiliary power plant output stops and the receptacle does not work.

Three-Phase Auxiliary Power

▲ **Stop engine.**

▲ **Power and weld outputs are live at the same time. Disconnect or insulate unused cables.**

☞ *Have qualified person install according to circuit diagram and Auxiliary Power Guidelines (see Section 11).*

Remove auxiliary power panel mounting screws. Tilt panel forward.

3 Lead 93

4 Lead 92

5 Lead 91

6 Lead 42 (Circuit Grounding Lead)

7 Lead 90 (Neutral)

8 Isolated Neutral Terminal

9 Jumper Lead 42

10 Grounding Terminal

Jumper 42 is connected to lead 90 at factory. Jumper 42 may be disconnected from neutral to meet applicable electrical codes.

Lead 42 connects to front panel Ground stud.

11 User-Supplied Leads

12 Circuit Breaker CB7 User Terminals

Connect user-supplied leads to terminals on CB7.

☞ *Circuit breaker CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all auxiliary power plant output stops and the receptacle does not work.*

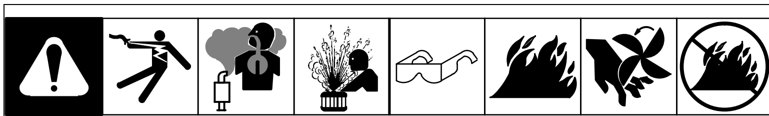
Reinstall auxiliary power panel.

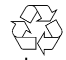
Ref. 197 399 / 802 332-B

SECTION 8 – MAINTENANCE & TROUBLESHOOTING

Note ☞ *Follow the storage procedure in the engine owner's manual if the unit will not be used for an extended period.*

8-1. Routine Maintenance





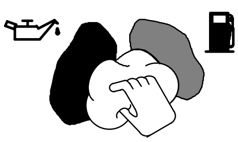
Recycle engine fluids.

▲ **Stop engine before maintaining.**

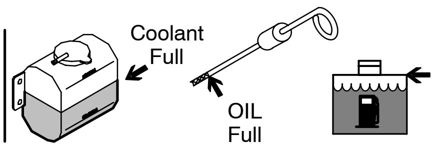
☞ *See also Engine Manual and Maintenance Label. Service unit more often if used in severe conditions.*

* To be done by Factory Authorized Service Agent.

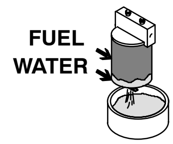
8 h



Wipe Up Spills.

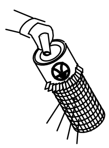


Check Fluid Levels. See Section 4-7.

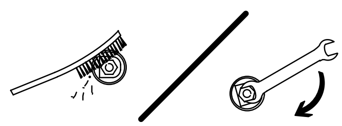


Drain Water From Fuel System.

50 h

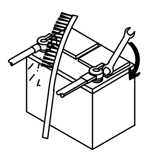


Clean Air Filter. See Section 8-3.



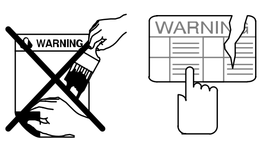
Clean And Tighten Weld Terminals.

100 h

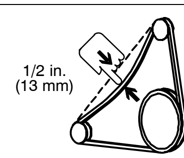


Clean And Tighten Battery Connections.

200 h

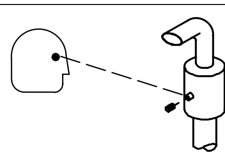


Replace Unreadable Labels.



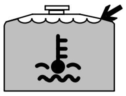
Check Belt Tension.

250 h

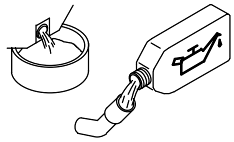


Check And Clean Spark Arrestor. See Section 8-4.

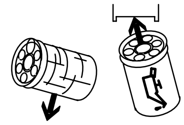
400 h



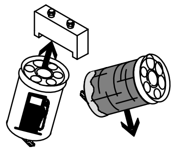
Check Radiator Fluid Level. See Section 4-7.



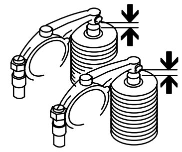
Change Oil. See Section 8-6.



Change Oil Filter. See Section 8-6.

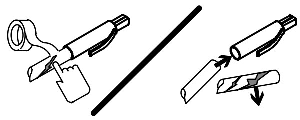


Change Fuel Filters. See Section 8-6.



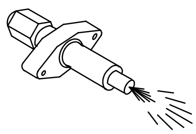
Check Valve Clearance.*

500 h



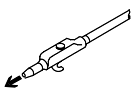
Repair Or Replace Damaged Cables.

800 h

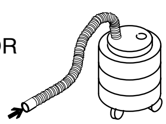


Clean/Set Injectors.*

1000 h

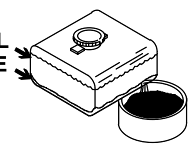


OR

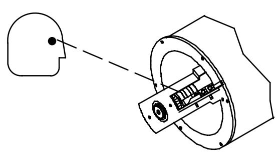


Blow Out Or Vacuum Inside. During Heavy Service, Clean Monthly.

FUEL SLUDGE



Drain Sludge From Fuel Tank. See Section 8-6.



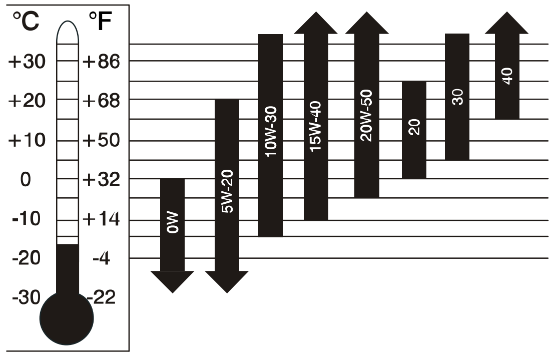
Service Welding Generator Brushes And Slip Rings. Service More Often In Dirty Conditions.*

8-2. Maintenance Label

PERKINS 3.152 AND 104.22 DIESEL ENGINES

See Engine Manual for complete engine care.
Give Engine Specification and Serial Number when ordering parts.

Check daily.



Recommended Oil ...
API Service Classification CF/4

	3.152	104.22
Oil Change & Filter .. dirty conditions	250 hours or less	100 hours or less
normal conditions	400 hours	250 hours
Oil Filter	MILLER 192 936 Perkins 2654408 Fram PH2895	MILLER 197 899 Perkins 140516130 Fram PH2844
Oil Capacity	6.1 qts. (5.8L)	7.0 qts. (6.6L)
... with filter change	6.5 qts. (6.2L)	7.5 qts. (7.1L)

Diesel

Fuel Capacity .... 24.75 Gal (93.7L)
Fuel Grade .... 1-D or 2-D Cetane No. 40 min.
Primary Fuel Filter/
Water Separator ... MILLER 192744, Donaldson P550587, Fram P1145A
Secondary Fuel Filter .. (3.152) MILLER 192937, Perkins 26561117 or 26560017
Secondary Fuel Filter .. (104.22) MILLER 197997, Perkins 130366020
Fill filter with clean fuel before installing - read instructions on filter.

Air Filter Service .... 50 hours or less - see Owner's Manual
Air Filter Element ..... MILLER 192938, Donaldson P822768, Wix 46489
Air Filter Safety Element (Opt.) ... MILLER 192939, Donaldson P822769, Wix 46490

Check daily.

	3.152	104.22
Coolant Capacity ..	12 qt (11.4 L)	9.5 qt (9.01 L)
Thermostat	180°F (82°C), Perkins 2485666	180°F (82°C), Perkins 145206180
Radiator Cap 7 lb..	MILLER 605982, Gates 31327	MILLER 605982, Gates 31327

Protect to lowest expected temperature with ethylene glycol based anti-freeze. Protect to at least -34°F (-37°C) for year-round lubrication and antirust protection.

Battery .... BCI Group 24
Cranking Performance at 0°F (-18°C) .... 650 Amps

Valve Clearance - Cold

	3.152	104.22
Intake	0.012 in. (.30mm)	.0078 in. (0.2mm)
Exhaust	0.012 in. (.30mm)	.0078 in. (0.2mm)

Engine RPM - No Load
Weld 1850

	3.152	104.22
Idle (Opt.).....	1500	1250

Fan Belt ...	3.152	104.22
MILLER	193163	197944
Perkins	2614B543	080109105
Gates	9465	

	3.152	104.22
Injectors	Perkins 2645 K005	Perkins 131406360
Intake Air Heater	Perkins 2668108	
Glow Pug		Perkins 185366210

Have only trained technician maintain injection pump and injectors. AIR, WATER, or GASOLINE will harm the injection system. If engine has run out of fuel or fuel filter is changed, bleeding of air may be required. Injectors should be checked annually. Check engine manual for proper procedure.

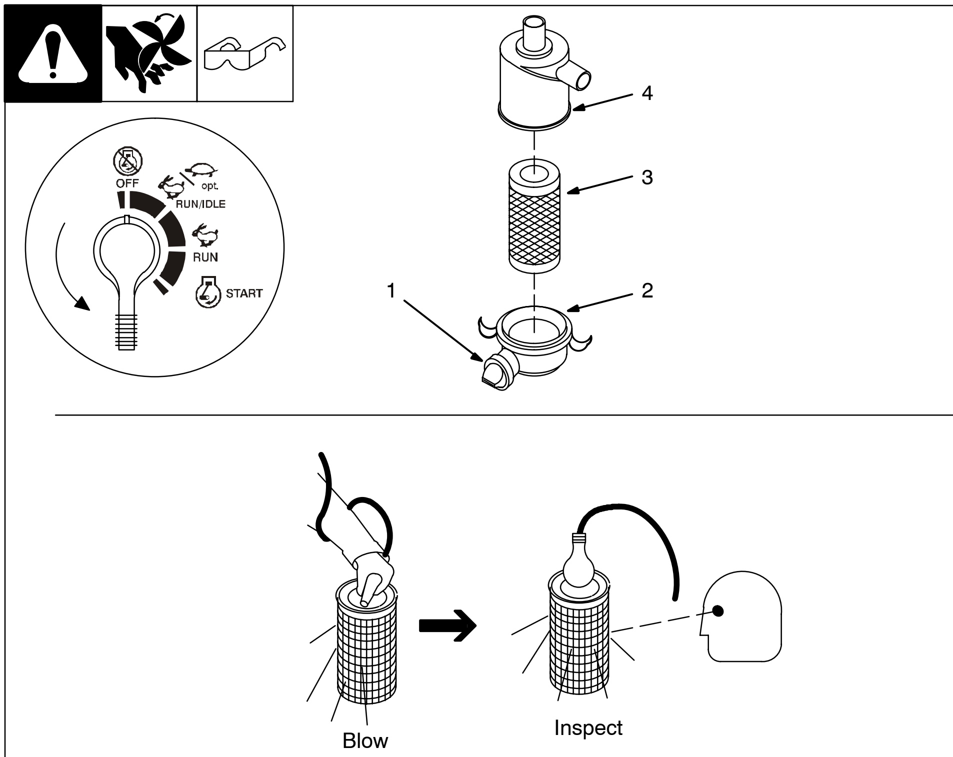
Do NOT use ether.

Spark Arrestor Inspection And Service .... 250 operating hours - see Owner's Manual

Optional

190 518-E

8-3. Servicing Air Cleaner



▲ **Stop engine.**

▲ **Do not run engine without air cleaner or with dirty element.**

1 Evacuator Valve

2 Dust Cap

3 Element

4 Housing

Clean or replace element if dirty or damaged. Replace element yearly or after six cleanings.

To Clean air filter:

Wipe off cap and housing. Remove cap and dump out dust. Wipe dust from inside cap and housing with damp cloth. Remove element and reinstall cap.

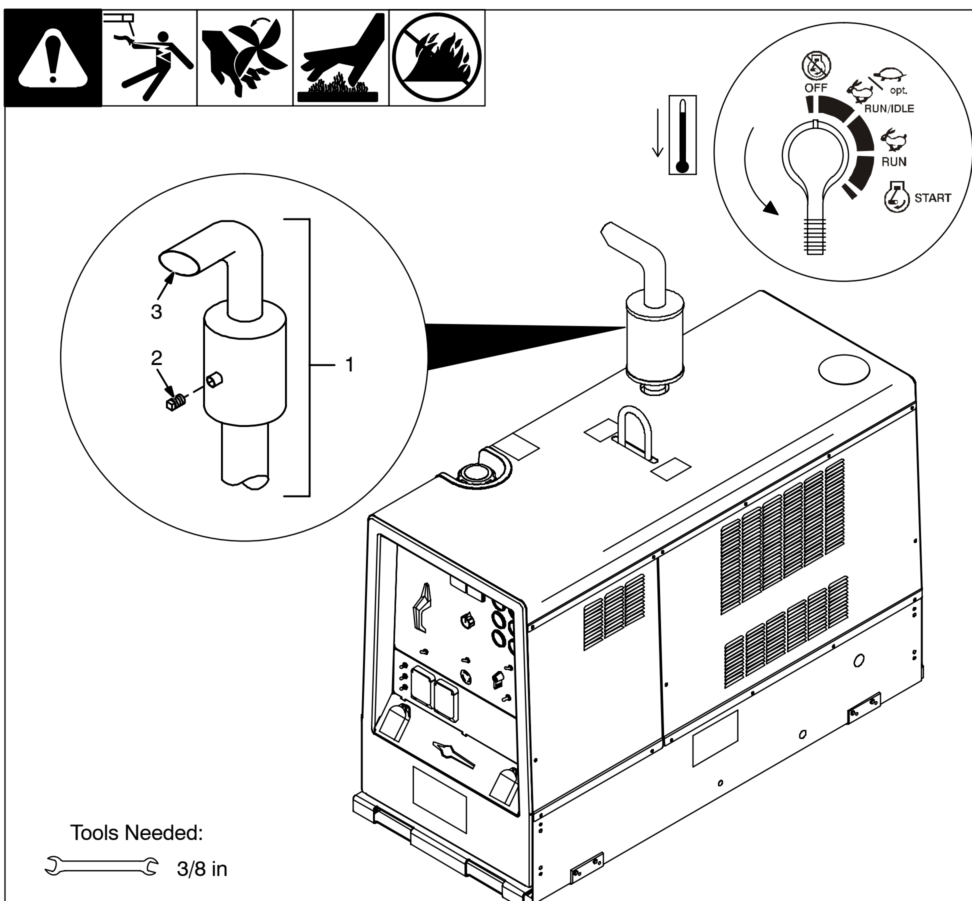
▲ **Do not clean housing with air hose.**

Clean element with compressed air. Max. air pressure: 100 psi (690 kPa). Replace element if it has holes or damaged gaskets.

Reinstall element and cap

Ref. 187 602-A / 801 964 / Ref. 191 631-C

8-4. Inspecting And Cleaning Optional Spark Arrestor Muffler



▲ **Stop engine and let cool.**

1 Spark Arrestor Muffler

2 Cleanout Plug

Remove plug and remove any dirt covering cleanout hole.

3 Exhaust Pipe

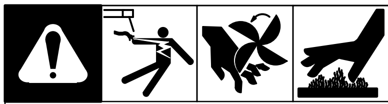
Start engine and run at idle speed to blow out cleanout hole. If nothing blows out of hole, briefly cover end of exhaust pipe with fireproof material.

▲ **Stop engine and let cool.**

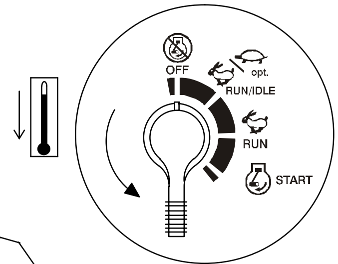
Reinstall cleanout plug.

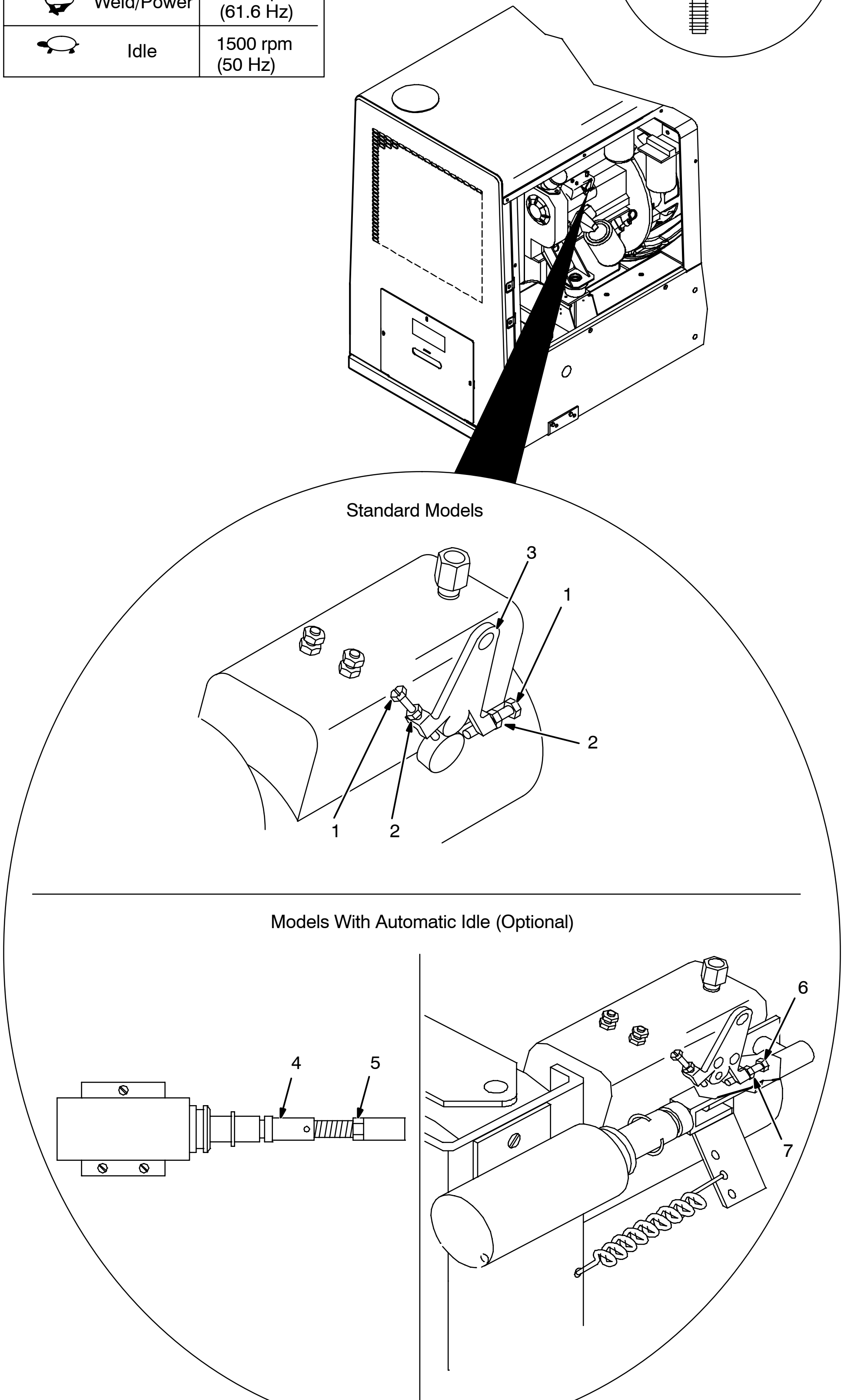
802 160-A / Ref. 191 631-C

8-5. Adjusting Engine Speed



Engine Speed (No Load)	
Weld/Power	1850 rpm (61.6 Hz)
Idle	1500 rpm (50 Hz)





▲ **Stop engine and let cool.**

Engine speed is factory set and should not require adjustment. After tuning engine, check engine speed with tachometer or frequency meter. See table for proper no load speed. If necessary, adjust speed as follows:

Start engine and run until warm.

On CC Models, place Stick/TIG switch in Stick position.

On CC/CV models, turn Process/Contactor switch to Stick – Electrode Hot position.

Standard Models

1 Adjustment Screw

2 Lock Nut

Loosen nuts. Turn screws out several turns.

3 Speed Lever

Start engine and move lever until engine runs at weld/power speed. Tighten adjustment screws and lock nuts.

☞ *Do not set engine speed higher than specified.*

Models With Automatic Idle (Optional)

Idle Speed Adjustment

4 Throttle Rod/Plunger

5 Locknut

Loosen locknut. Place Engine Control switch in Run/Idle position.

Turn throttle rod and plunger until engine runs at idle speed. Tighten locknut.

☞ *Be sure solenoid plunger pulls all the way in ("bottoms") when energized.*

Weld/Power Speed Adjustment

6 Engine Weld/Power Speed Adjustment Screw

7 Locknut

Place Engine Control switch in Run position.

Loosen locknut. Turn screw until engine runs at weld/power speed. Tighten locknut.

☞ *Do not set engine speed higher than specified.*

▲ **Stop engine.**

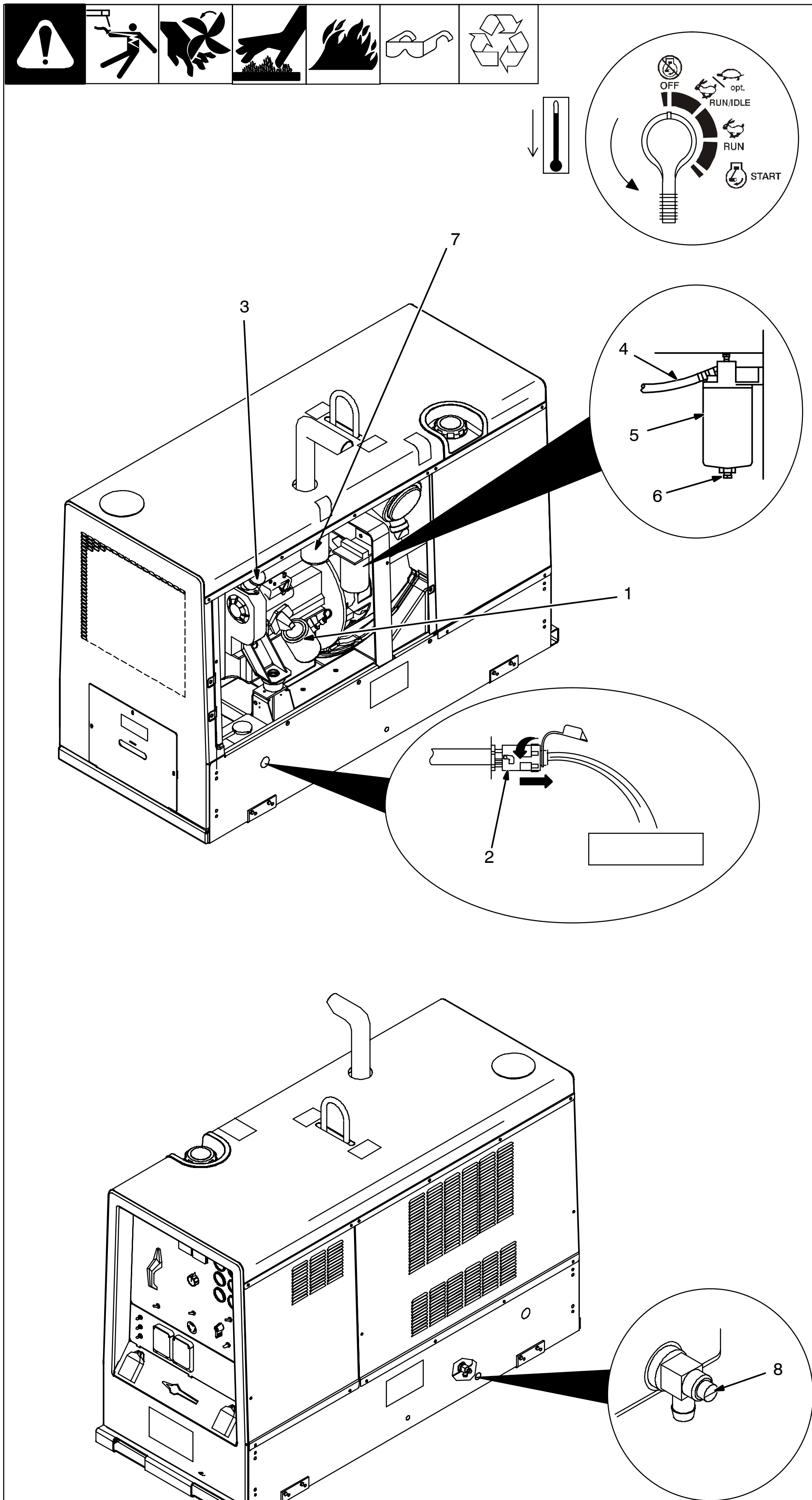
Close door.

Tools Needed:

5/16 in

802 168-C / 802 229-A / Ref. 191 631-C

8-6. Servicing Fuel And Lubrication Systems



▲ **Stop engine and let cool.**

▲ **After servicing, start engine and check for fuel leaks. Stop engine, tighten connections as necessary, and wipe up spilled fuel.**

1 Oil Filter
2 Oil Drain Valve And Hose
3 Oil Fill Cap
4 Fuel Line
5 Primary Fuel Filter (Fuel/ Water Separator)
6 Petcock
7 Secondary Fuel Filter
8 Fuel Tank Sludge Drain Valve

To change oil and filter:

Route oil drain hose and valve through hole in base. See engine manual and engine maintenance label for oil/filter change information.

To drain water from fuel system:

Open primary fuel filter petcock and drain water into metal container. Close petcock when water-free fuel flows.

To replace primary fuel filter:

Turn filter counterclockwise. Remove filter.

Fill new filter with fresh fuel. Apply thin coat of fuel to gasket on new filter. Install new filter and turn clockwise. Bleed air from fuel system according to engine manual.

Inspect fuel lines, and replace if cracked or worn.

To replace secondary fuel filter:

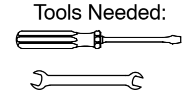
See engine manual.

To drain sludge from fuel tank:

Put metal container under drain, and use screwdriver to open sludge drain valve. Close valve when sludge has drained.

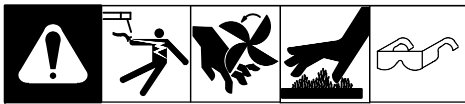
Close door.

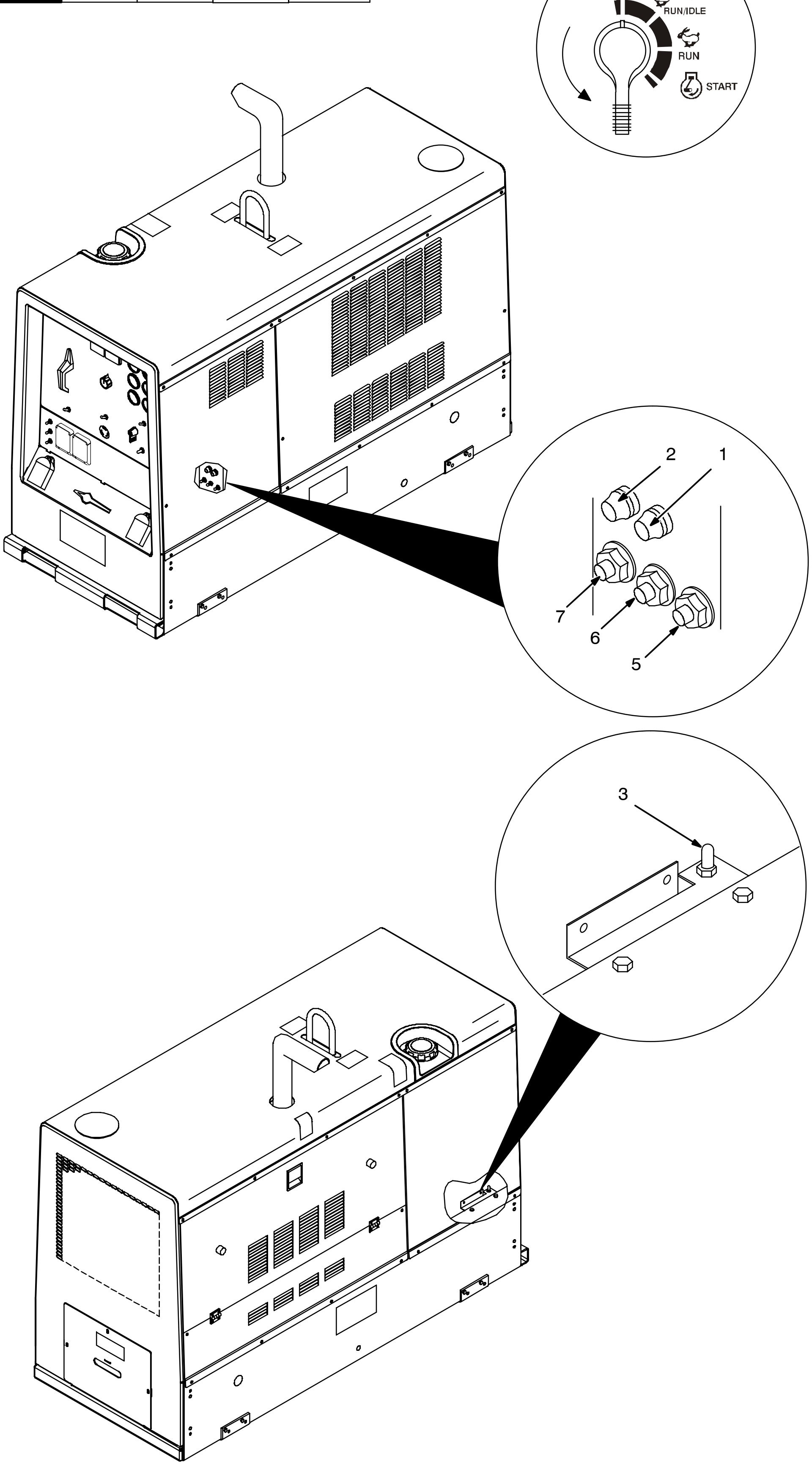
Tools Needed:



802 170-A / Ref. 802 168-B / Ref. 801 434

8-7. Overload Protection





▲ **Stop engine.**

☞ *When a circuit breaker or fuse opens, it usually indicates a more serious problem exists. Contact Factory Authorized Service Agent.*

1 Fuse F1

2 Fuse F2

F1 and F2 protect the stator exciter winding from overload. If F1 opens, weld and auxiliary power is low or stops entirely. If F2 opens, weld output is low or stops entirely. 4 kVA/kW auxiliary power is still available.

3 Circuit Breaker CB6 (CC/CV Models Only)

4 Circuit Breaker CB10 (Not Shown)

5 Circuit Breaker CB11

6 Circuit Breaker CB12

7 Circuit Breaker CB13

CB6 protects the 24 and 115 volt ac output to remote receptacle RC14, and 24 volt output to field current regulator board PC1 (CC/CV models only). If CB6 opens, weld output and 24 and 115 volt output to RC14 stops.

CB10 protects the engine battery circuit. If CB10 opens, the engine will not crank. CB10 automatically resets when the fault is corrected.

CB11 protects the engine wiring harness. On CC models, if CB11 opens the max OCV circuit does not work and open circuit voltage is variable at all times (see max OCV note under Weld Controls in Section 5-2). If CB11 opens on CV models, weld output stops (auxiliary power is still available).

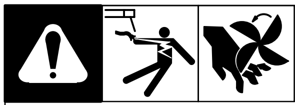
CB12 protects the field flashing circuit. If CB12 opens, the generator may not excite at start-up and weld and auxiliary power output may not be available.

CB13 protects the engine shutdown circuit. If CB13 opens, the engine cranks but does not start.

Press button to reset breaker.

802 170-A / Ref. 802 168-C

8-8. Diagnosing Causes Of Engine Fault Shutdowns

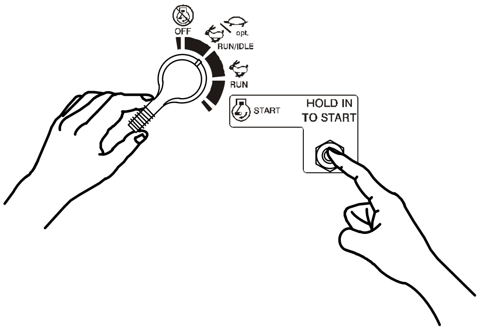


Use the front panel engine lights to help determine the cause of an automatic engine shutdown.

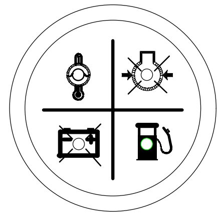
☞ *Correct the cause of the shutdown before operating the welding generator.*

☞ *This unit does not have a battery charging fault shutdown. The engine continues to run if the Battery Charging Light goes on.*

Pre-Start Diagnostic Checks



Turn Engine Control Switch To Run/Idle Position While Pressing Magnetic Shutdown Switch.



Normal Condition:
Oil Pressure Light On;
Battery Charging, Fuel, And Temperature Lights Off.

If Oil Pressure Light Is Off, See Factory Authorized Service Agent.

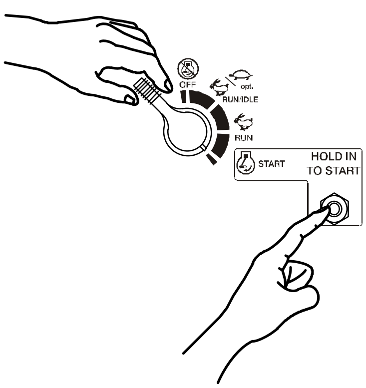
If Battery Charging Light Is On, Have Factory Authorized Service Agent Check Alternator.

If Temperature Light Is On, Correct Cause Of Overheating (See Engine Manual).
If Engine Is Okay, See Factory Authorized Service Agent.

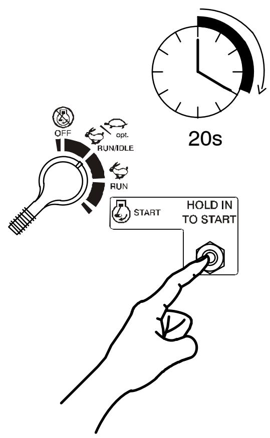
If Fuel Light Is On, Check Fuel Level.

If Fault Continues, See Factory Authorized Service Agent.

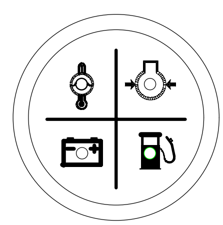
Diagnostic Checks While Running



Start Engine (With No Load Applied).



Continue Pressing Shutdown Switch Until Engine Lights Go Off.



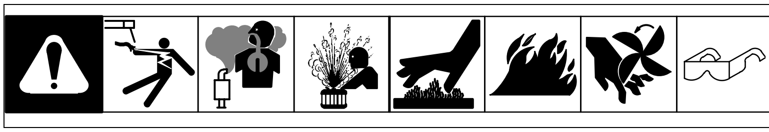
Normal Condition:
Engine Lights Go Off As Engine Reaches Normal Operating Condition.

Lights That Stay On After 20 Sec. Indicate Fault Condition.

Stop Engine And Correct Fault (See Above) If Fault Continues, See Factory Authorized Service Agent.

Ref. 191 631-C

8-9. Troubleshooting



A. Welding – CC Models

Trouble	Remedy
No weld output; auxiliary power output okay.	Check position of Ampere Range switch.
	Check position of optional polarity switch.
	Place Amperage Adjust switch in Panel position, or place switch in Remote position and connect remote control to Remote Amperage Adjust receptacle RC13 (see Sections 4-10 and 5-1).
	Check and secure connections to Remote Amperage Adjust receptacle RC13 (see Section 4-10).
	Check fuse F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR2 and the rotor.
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
No weld output or auxiliary power output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Check fuses F1 and F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, integrated rectifier SR2, and the rotor.
	Reset circuit breaker CB12. Have Factory Authorized Service Agent check diode D1 (see Section 8-7).
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
Erratic weld output.	Check and tighten connections inside and outside unit.
	Be sure connection to work piece is clean and tight.
	Use dry, properly stored electrodes.
	Remove excessive coils from weld cables.
High weld output.	Check engine speed, and adjust if necessary.
	Have Factory Authorized Service Agent check OCV control circuit.
Low weld output.	Check engine speed, and adjust if necessary.
	Check fuses F1 and F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, integrated rectifier SR2, and the rotor.
Low open-circuit voltage.	Check engine speed, and adjust if necessary.
Maximum weld output only in each ampere range (with Stick/TIG Selection switch in Stick position).	Have Factory Authorized Service Agent check control relay CR7.
No remote fine amperage control.	Place Amperage Adjust switch in correct position.
	Check and secure connections to Remote Amperage Adjust receptacle RC13 (see Section 4-10).
	Reset circuit breaker CB11 (see Section 8-7). Have Factory Authorized Service Agent check control relay CR7.
	Repair or replace remote control device.
	Have Factory Authorized Service Agent check OCV control circuit.

B. Welding – CC/CV Models

Trouble	Remedy
No weld output; auxiliary power output okay.	Place Process/Contactor switch in a Electrode Hot position, or place switch in a Remote position and connect remote contactor to optional Remote 14 receptacle RC14 (see Sections 4-11 and 6-1).
	Check position of Ampere Range switch.
	Check position of optional polarity switch.
	Reset circuit breaker CB11 (see Section 8-7).
	Reset circuit breaker CB6 (see Section 8-7). Check for faulty remote device connected to RC14.
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-11).
	Have Factory Authorized Service Agent check connector board PC6 and connections.
	Check fuse F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check brushes and slip rings, field excitation circuit, field current regulator board PC1, and the rotor.
No weld output or auxiliary power output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Check fuses F1 and F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor.
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
Erratic weld output.	Check and tighten connections inside and outside unit.
	Be sure connection to work piece is clean and tight.
	Use dry, properly stored electrodes.
	Remove excessive coils from weld cables.
High weld output.	Check position of Ampere Range switch and Voltage/Amperage Adjust control.
	Check engine speed, and adjust if necessary.
	Have Factory Authorized Service Agent check field current regulator board PC1.
Low weld output.	Check engine speed, and adjust if necessary.
	Check fuses F1 and F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, field current regulator board PC1, and the rotor.
Low open-circuit voltage.	Check engine speed, and adjust if necessary.
No remote fine amperage or voltage control.	Place Voltage/Amperage Adjust switch in Remote position.
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-11).
	Repair or replace remote control device.
Constant speed wire feeder does not work.	Reset circuit breaker CB6 (see Section 8-7).
	Check and secure connections to Remote 14 receptacle RC14 (see Section 4-11).
	Repair or replace wire feeder.
Low CV weld output.	Set Ampere Range switch to highest range.
Min or max CV weld output only.	Check position of Voltage/Amperage Adjust control and Voltage/Amperage Adjust switch.
	Repair or replace remote control device.
	Have Factory Authorized Service Agent check field current regulator board PC1.

C. Standard Auxiliary Power

Trouble	Remedy
No auxiliary power output; weld output okay.	Reset receptacle circuit breakers.
No auxiliary power or weld output.	Disconnect equipment from auxiliary power receptacles during start-up.
	Check fuses F1 and F2, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR1, capacitor C9, and the rotor.
	Reset circuit breaker CB12. Have Factory Authorized Service Agent check diode D1 (CC models) or field current regulator board PC1 (CC/CV models) (see Section 8-7).
	Have Factory Authorized Service Agent check brushes and slip rings, and field excitation circuit.
High output at auxiliary power receptacles.	Check engine speed, and adjust if necessary.
	Have Factory Authorized Service Agent adjust auxiliary power field current resistor R3.
Low output at auxiliary power receptacles.	Check engine speed, and adjust if necessary.
	Check fuse F1, and replace if open (see Section 8-7). Have Factory Authorized Service Agent check integrated rectifier SR1, resistor R3, and capacitor C9.

D. Optional Auxiliary Power Plant

Trouble	Remedy
No or low output at optional auxiliary power plant/receptacle RC5 (CC/CV models only).	Place Process/Contactor switch in Electrode Hot - Stick position (see Section 6-3).
	Reset circuit breaker CB7(see Section 7-2).
	Check engine weld/power speed, and adjust if necessary (see Section 8-5).
	Have Factory Authorized Service Agent check brushes and slip rings, and field current regulator board PC1.
High output at optional auxiliary power plant/receptacle RC5 (CC/CV models only).	Check engine weld/power speed, and adjust if necessary (see Section 8-5).
	Have Factory Authorized Service Agent check field current regulator board PC1.

E. Engine

Trouble	Remedy
Engine will not crank.	Check battery, and replace if necessary.
	Check battery connections and tighten if necessary.
	Circuit breaker CB10 may be open. CB10 automatically resets when fault is corrected (see Section 8-7). Have Factory Authorized Service Agent check engine wiring harness and components.
	Check engine wiring harness plug connections.
	Have Factory Authorized Service Agent check Engine Control switch S1.
Engine cranks but does not start.	Press Magnetic Shutdown switch MS1 when starting engine.
	Check fuel level.
	Reset circuit breaker CB13 (see Section 8-7). Have Factory Authorized Service Agent check engine-wiring harness and components.
	Check battery and replace if necessary. Check engine charging system according to engine manual.
	Have Factory Authorized Service Agent check control relay CR2, and fuel solenoid FS1.
	Air in fuel system. See engine manual.

Trouble	Remedy
Engine starts, but stops when Magnetic Shutdown switch is released.	When starting engine, continue holding Magnetic Shutdown switch until after engine indicator lights go out.
	Check oil, and coolant levels. Automatic shutdown system stops engine if oil pressure is too low or coolant temperature is too high (see Sections 4-7 and 8-8).
Engine hard to start in cold weather.	Use starting aid switch (see Section 5-1 or 6-1).
	Keep battery in good condition. Store battery in warm area off cold surface.
	Use fuel formulated for cold weather (diesel fuel can gel in cold weather). Contact local fuel supplier for fuel information.
	Use correct grade oil for cold weather (see Section 8-2).
Engine suddenly stops.	Check fuel, oil, and coolant levels. Automatic shutdown system stops engine if fuel level or oil pressure is too low, or coolant temperature is too high (see Sections 4-7 and 8-8).
	See engine manual.
Engine slowly stopped and cannot be restarted.	Check fuel level.
	Check engine air and fuel filters (see Sections 8-3 and 8-6).
	See engine manual.
Battery discharges between uses.	Turn Engine Control switch off when unit is not running.
	Clean top of battery with baking soda and water solution; rinse with clear water.
	Recharge or replace battery if necessary.
	Periodically recharge battery (approximately every 3 months).
Engine idles, but does not come up to weld speed (models with idle option only).	Have Factory Authorized Service Agent check idle module PC7 and current transformer CT1.
	Check for obstructed throttle solenoid.
Engine does not run at idle speed (models with idle option only).	Place Stick/TIG Selection switch (CC models) or Process/Contactor switch (CC/CV models) in Stick or MIG position.
	Check for obstructed throttle solenoid.
	Have Factory Authorized Service Agent check idle module PC7, and control relays CR3 and CR6.
Engine uses oil during run-in period; wetstacking occurs.	Dry engine (see Section 10).

SECTION 9 – ELECTRICAL DIAGRAMS

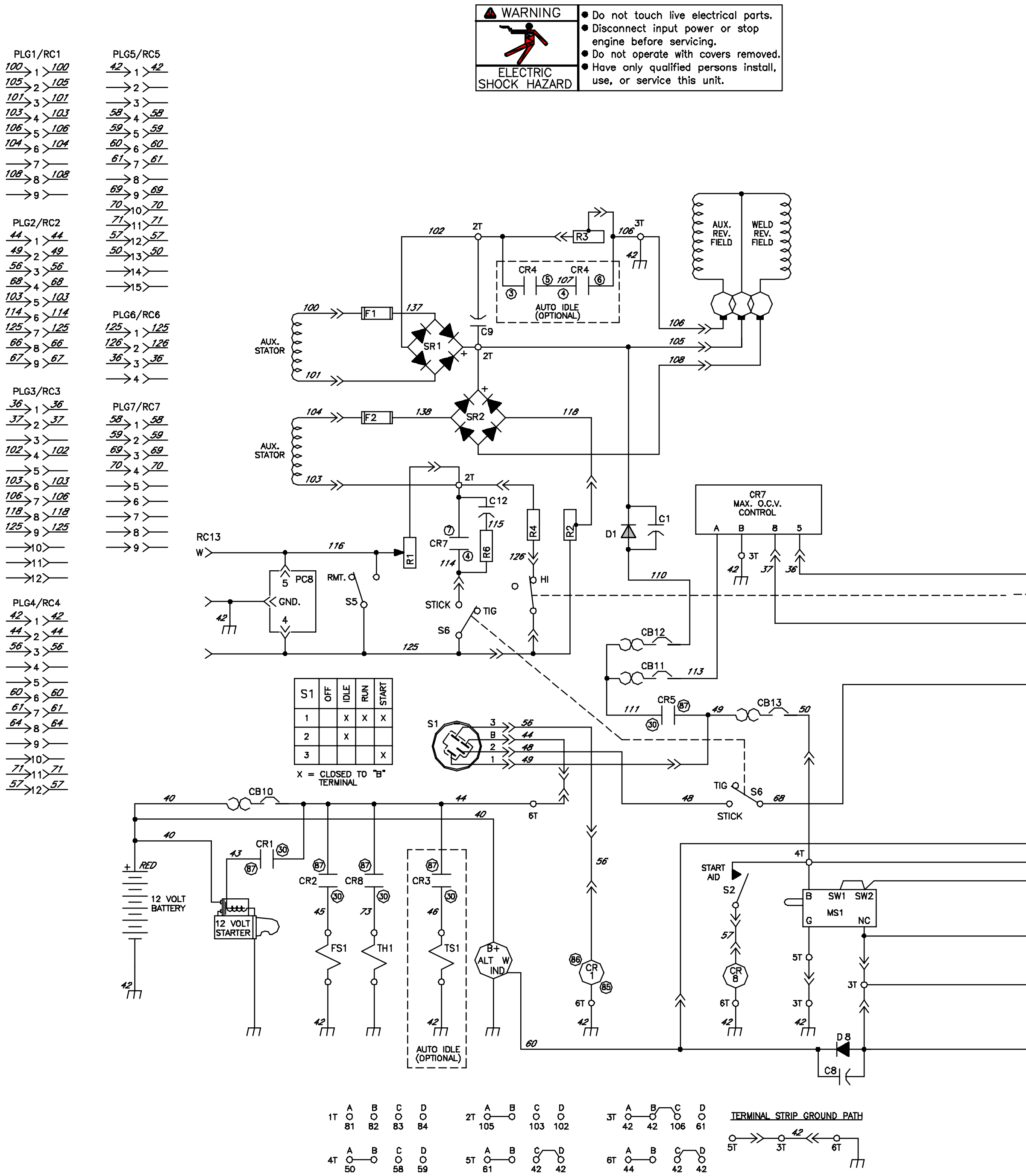
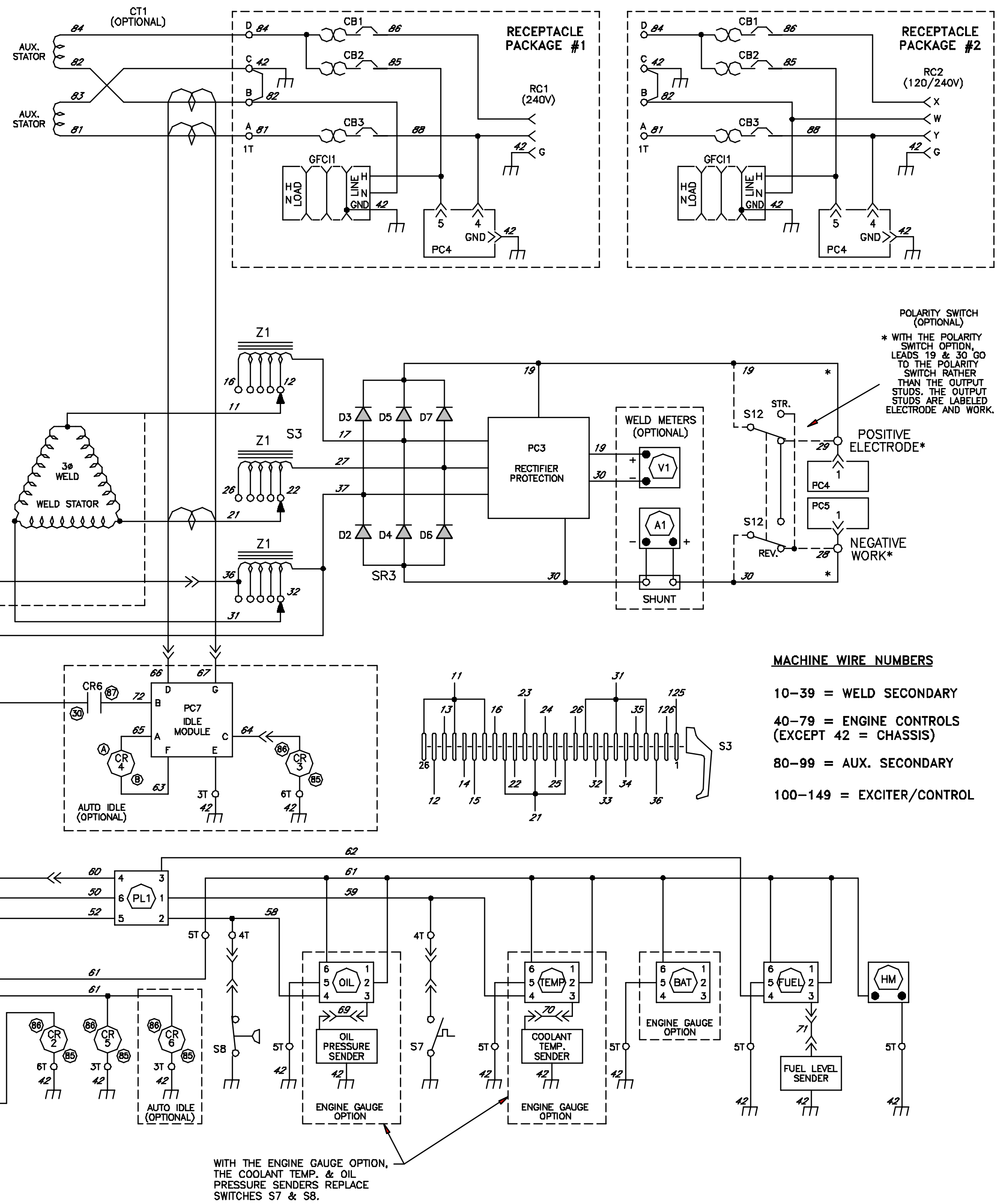
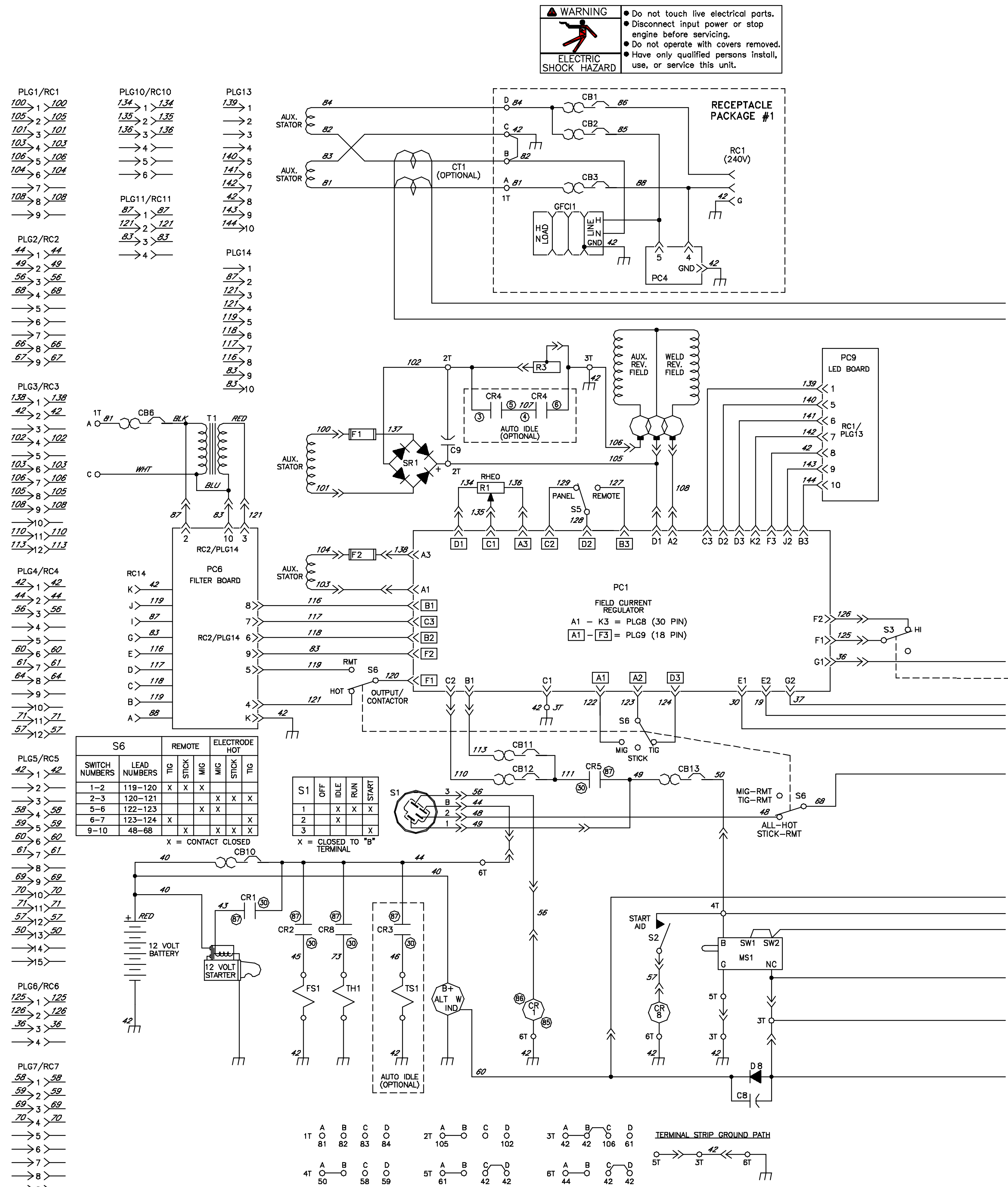


Figure 9-1. Circuit Diagram For CC Welding Generator


CT1 (OPTIONAL)
AUX. STATOR
AUX. STATOR
RECEPTACLE PACKAGE #1
CB1
CB2
CB3
RC1 (240V)
GFCI1
LOAD
LINE
GND
PC4
RECEPTACLE PACKAGE #2
RC2 (120/240V)
POLARITY SWITCH (OPTIONAL)
* WITH THE POLARITY SWITCH OPTION, LEADS 19 & 30 GO TO THE POLARITY SWITCH RATHER THAN THE OUTPUT STUDS. THE OUTPUT STUDS ARE LABELED ELECTRODE AND WORK.
Z1
S3
3ø WELD
WELD STATOR
PC3
RECTIFIER PROTECTION
SR3
WELD METERS (OPTIONAL)
SHUNT
S12
STR.
REV.
POSITIVE ELECTRODE*
NEGATIVE WORK*
PC5
PC7
IDLE MODULE
AUTO IDLE (OPTIONAL)
MACHINE WIRE NUMBERS
10–39 = WELD SECONDARY
40–79 = ENGINE CONTROLS (EXCEPT 42 = CHASSIS)
80–99 = AUX. SECONDARY
100–149 = EXCITER/CONTROL
PL1
OIL
OIL PRESSURE SENDER
TEMP
COOLANT TEMP. SENDER
BAT
FUEL
FUEL LEVEL SENDER
HM
ENGINE GAUGE OPTION
S7
S8
AUTO IDLE (OPTIONAL)
WITH THE ENGINE GAUGE OPTION, THE COOLANT TEMP. & OIL PRESSURE SENDERS REPLACE SWITCHES S7 & S8.

200 130



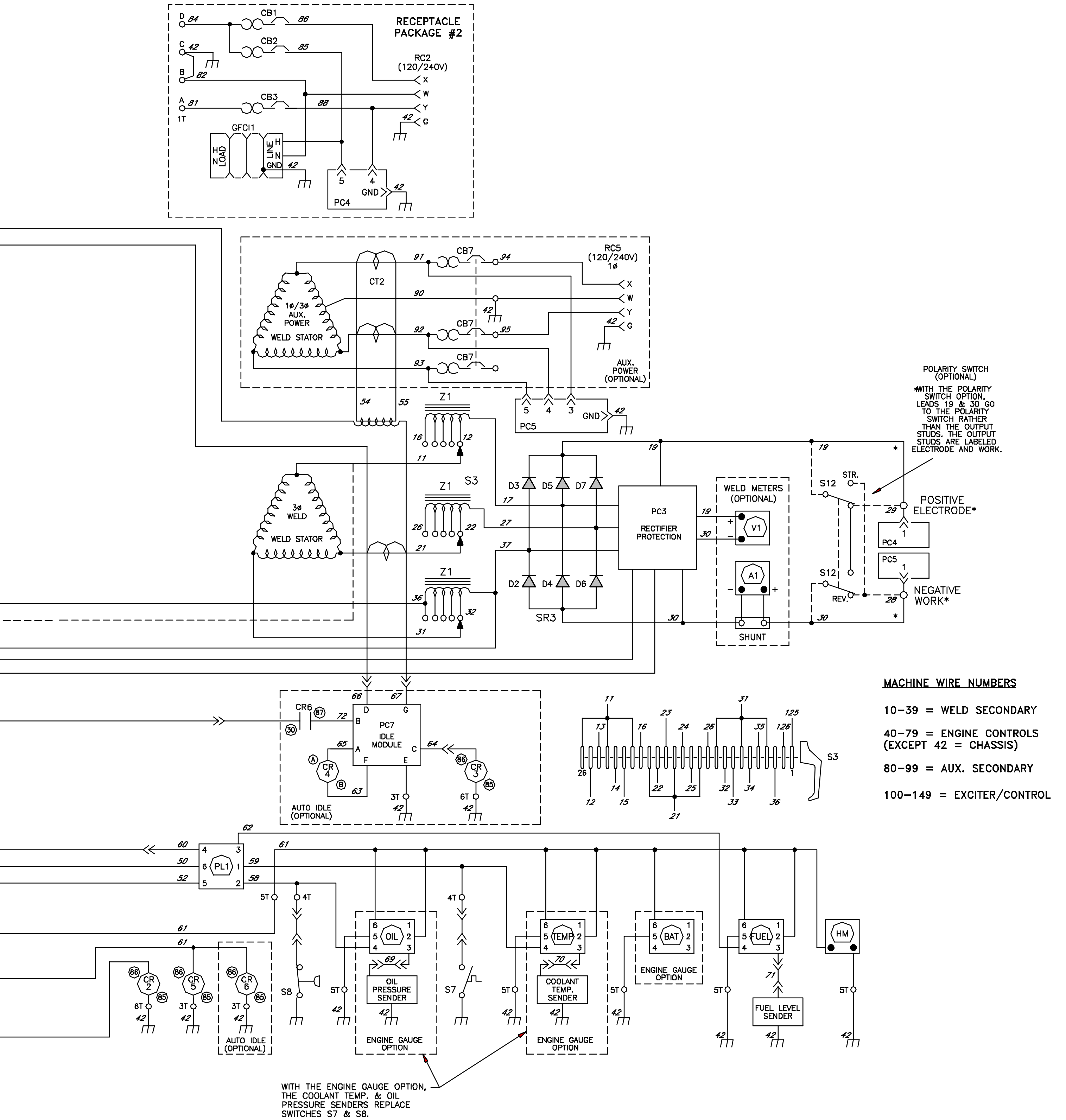
S6		REMOTE			ELECTRODE HOT		
SWITCH NUMBERS	LEAD NUMBERS	TIG	STICK	MIG	MIG	STICK	TIG
1–2	119–120	X	X	X			
2–3	120–121				X	X	X
5–6	122–123			X	X		
6–7	123–124	X					X
9–10	48–68		X		X	X	X

X = CONTACT CLOSED

S1	OFF	IDLE	RUN	START
1		X	X	X
2		X		
3				X

X = CLOSED TO "B" TERMINAL

Figure 9-2. Circuit Diagram For CC/CV Welding Generator



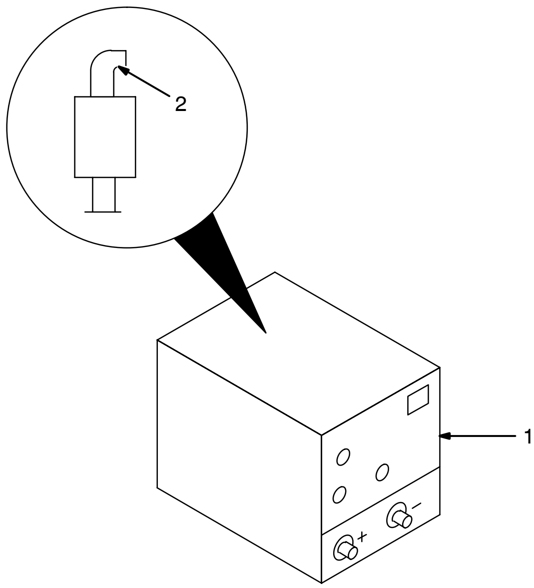
RECEPTACLE PACKAGE #2
CB1
CB2
CB3
RC2 (120/240V)
GFCI1
LOAD
LINE
GND
PC4
RC5 (120/240V) 1ø
CB7
CT2
1ø/3ø AUX. POWER WELD STATOR
AUX. POWER (OPTIONAL)
PC5
Z1
S3
3ø WELD WELD STATOR
D3
D5
D7
D2
D4
D6
SR3
PC3 RECTIFIER PROTECTION
WELD METERS (OPTIONAL)
V1
A1
SHUNT
POLARITY SWITCH (OPTIONAL)
*WITH THE POLARITY SWITCH OPTION, LEADS 19 & 30 GO TO THE POLARITY SWITCH RATHER THAN THE OUTPUT STUDS. THE OUTPUT STUDS ARE LABELED ELECTRODE AND WORK.
S12
STR.
REV.
POSITIVE ELECTRODE*
NEGATIVE WORK*
CR6
PC7 IDLE MODULE
AUTO IDLE (OPTIONAL)
PL1
S8
S7
OIL
OIL PRESSURE SENDER
TEMP
COOLANT TEMP. SENDER
BAT
FUEL
FUEL LEVEL SENDER
HM
ENGINE GAUGE OPTION
WITH THE ENGINE GAUGE OPTION, THE COOLANT TEMP. & OIL PRESSURE SENDERS REPLACE SWITCHES S7 & S8.
MACHINE WIRE NUMBERS
10–39 = WELD SECONDARY
40–79 = ENGINE CONTROLS (EXCEPT 42 = CHASSIS)
80–99 = AUX. SECONDARY
100–149 = EXCITER/CONTROL

194 008-C

SECTION 10 – RUN-IN PROCEDURE

run_in1 6/96

10-1. Wetstacking



1 Welding Generator

Run diesel engines near rated output during run-in period to properly seat piston rings and prevent wetstacking. See nameplate or rating label to find rated output.

☞ *Do not idle engine longer than necessary. Piston rings seat faster if engine runs at weld/power rpm, and the welding generator is kept loaded during run-in.*

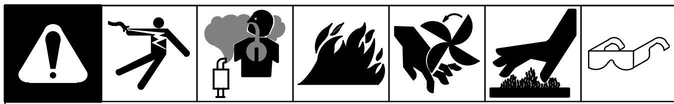
2 Engine Exhaust Pipe

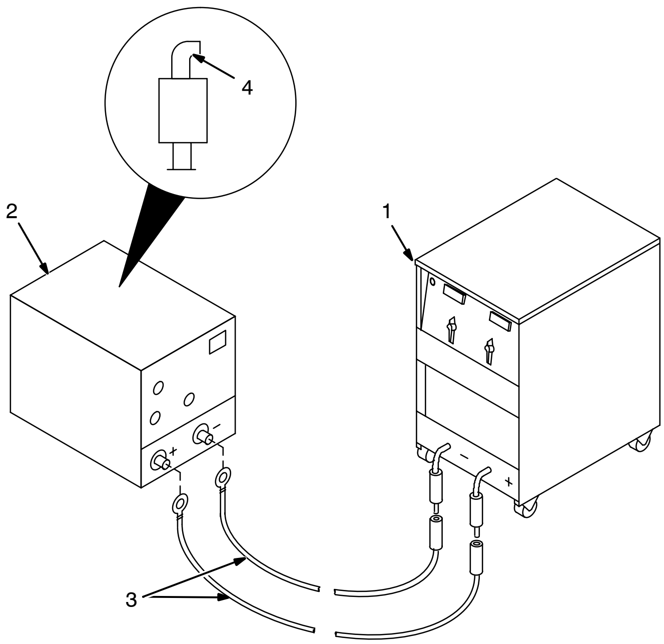
Wetstacking is unburned fuel and oil in the exhaust pipe and occurs during run-in if the engine is run too long at light load or idle rpm.

If exhaust pipe is coated with a wet, black, tar-like substance, dry the engine using one of the following run-in procedures.

See the engine manual for additional engine run-in information.

10-2. Run-In Procedure Using Load Bank





▲ **Stop engine.**

▲ **Do not touch hot exhaust pipe, engine parts, or load bank/grid.**

▲ **Keep exhaust and pipe away from flammables.**

1 Load Bank

Turn all load bank switches Off. If needed, connect load bank to 115 volts ac wall receptacle or generator auxiliary power receptacle.

2 Welding Generator

Place A/V range switch in maximum position, A/V control in minimum position, and Output Selector switch (if present) in either DC position.

3 Weld Cables

Connect load bank to generator weld output terminals using proper size weld cables with correct connectors. Observe correct polarity.

Start engine and run for several minutes.

Set load bank switches and then adjust generator A/V control so load equals rated generator output (see nameplate).

Check generator and load bank meters after first five minutes then every fifteen minutes to be sure generator is loaded properly.

☞ *Check oil level frequently during run-in; add oil if needed.*

After one hour (minimum) place A/V control in minimum position, then turn off load bank to remove load. Run engine several minutes at no load.

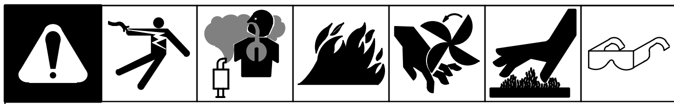
▲ **Stop engine and let cool.**

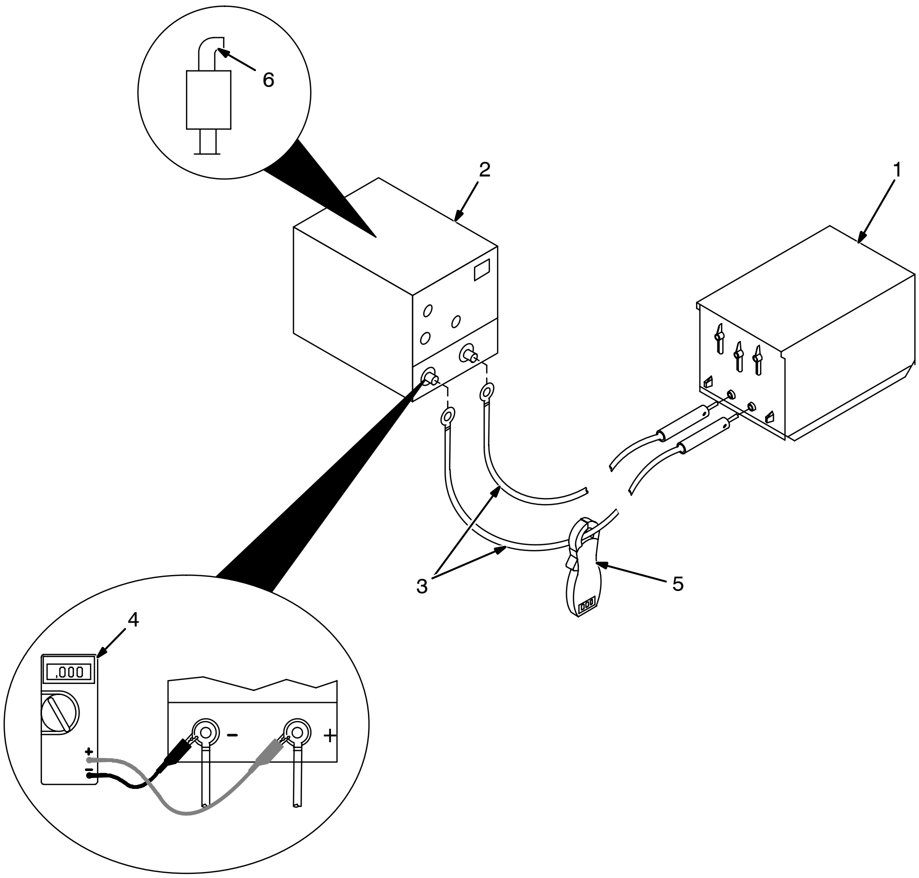
4 Engine Exhaust Pipe

Repeat procedure if wetstacking is present.

S-0683

10-3. Run-In Procedure Using Resistance Grid





▲ **Stop engine.**

▲ **Do not touch hot exhaust pipe, engine parts, or load bank/grid.**

▲ **Keep exhaust and pipe away from flammables.**

1 Resistance Grid

Use grid sized for generator rated output.

Turn Off grid.

2 Welding Generator

Place A/V range switch in maximum position, A/V control in minimum position, and Output Selector switch (if present) in either DC position.

3 Weld Cables

Connect grid to generator weld output terminals using proper size weld cables with correct connectors (polarity is not important).

4 Voltmeter

5 Clamp-On Ammeter

Connect voltmeter and ammeter as shown, if not provided on generator.

Start engine and run for several minutes.

Set grid switches and then adjust generator A/V control so load equals rated generator output (see nameplate).

Check generator and meters after first five minutes then every fifteen minutes to be sure generator is loaded properly.

☞ *Check oil level frequently during run-in; add oil if needed.*

After one hour (minimum), place A/V control in minimum position, then shut down grid to remove load. Run engine several minutes at no load.

▲ **Stop engine and let cool.**

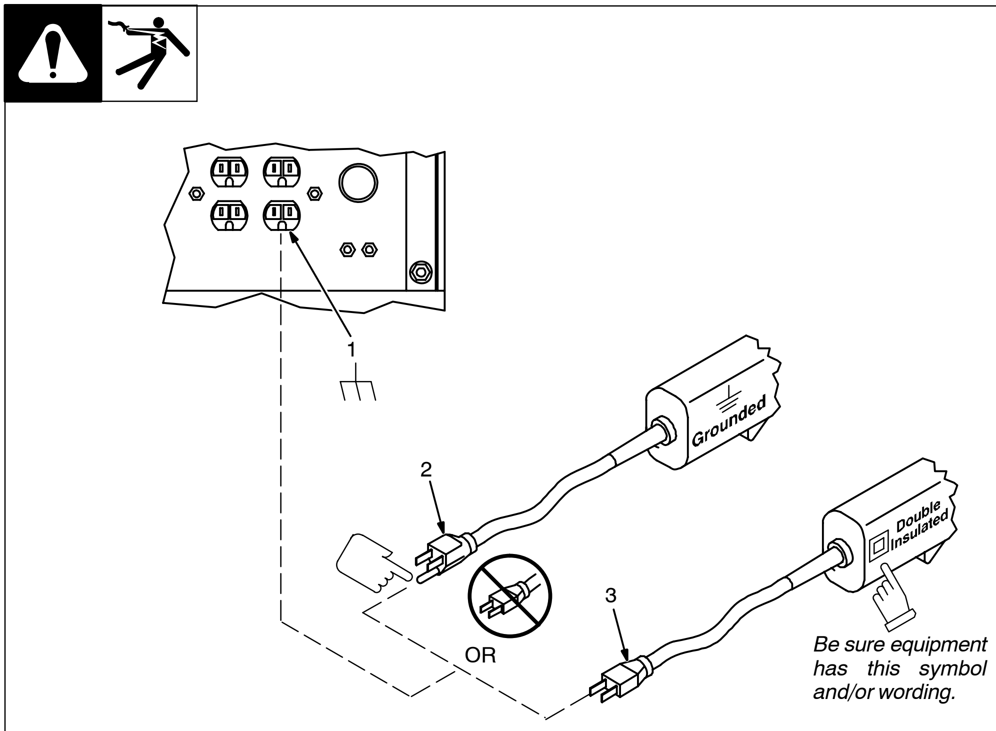
6 Engine Exhaust Pipe

Repeat procedure if wetstacking is present.

S-0684

SECTION 11 – AUXILIARY POWER GUIDELINES

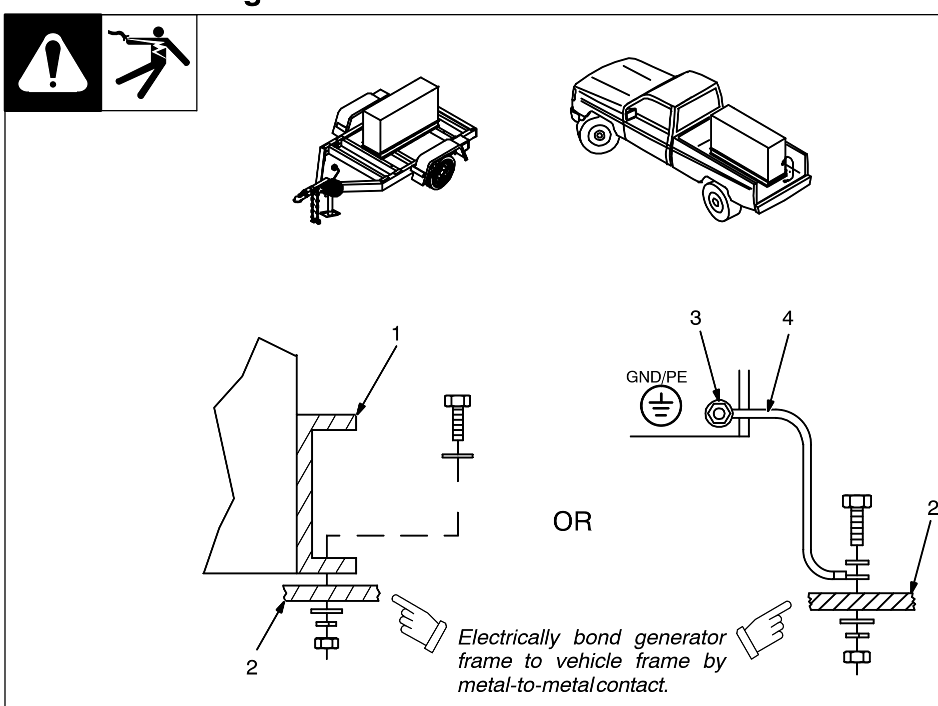
11-1. Selecting Equipment



1 Auxiliary Power Receptacles – Neutral Bonded To Frame
2 3-Prong Plug From Case Grounded Equipment
3 2-Prong Plug From Double Insulated Equipment

aux_pwr 2/99 – Ref. ST-159 730 / ST-800 577

11-2. Grounding Generator To Truck Or Trailer Frame



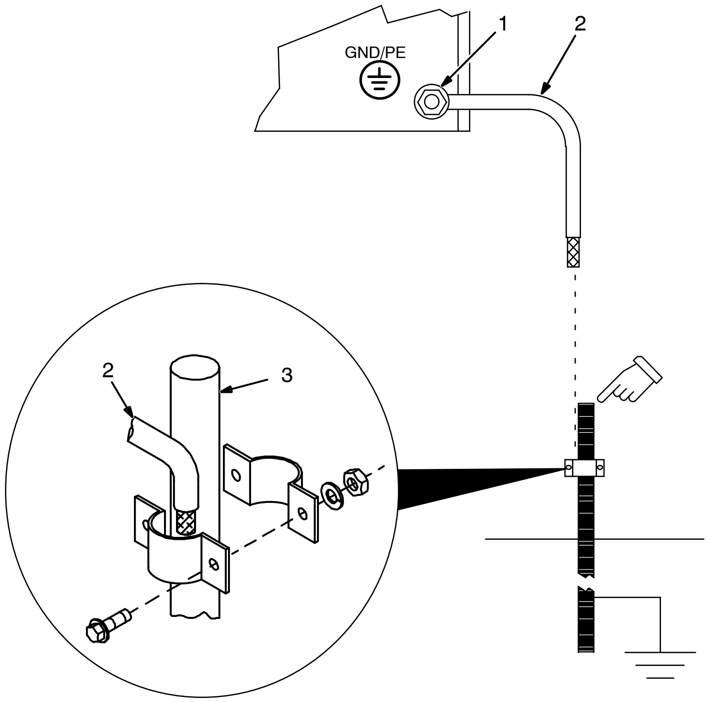
1 Generator Base
2 Metal Vehicle Frame
3 Equipment Grounding Terminal
4 Grounding Cable

Use #10 AWG or larger insulated copper wire.

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

S-0854

11-3. Grounding When Supplying Building Systems



1 Equipment Grounding Terminal

2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

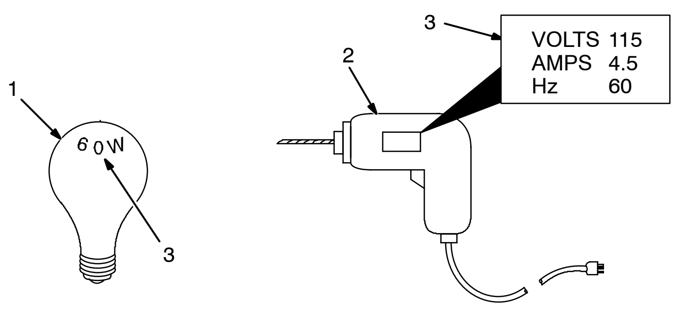
3 Ground Device

▲ **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

Use ground device as stated in electrical codes.

ST-800 576-B

11-4. How Much Power Does Equipment Require?



1 Resistive Load

A light bulb is a resistive load and requires a constant amount of power.

2 Non-Resistive Load

Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 11-8).

3 Rating Data

Rating shows volts and amperes, or watts required to run equipment.

AMPERES x VOLTS = WATTS

EXAMPLE 1: If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.

4.5 A x 115 V = 520 W

The load applied by the drill is 520 watts.

EXAMPLE 2: If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

(200 W + 200 W + 200 W) + 520 W = 1120 W

The total load applied by the three flood lamps and drill is 1120 watts.

S-0623

11-5. Approximate Power Requirements For Industrial Motors

Industrial Motors	Rating	Starting Watts	Running Watts
Split Phase	1/8 HP	800	300
	1/6 HP	1225	500
	1/4 HP	1600	600
	1/3 HP	2100	700
	1/2 HP	3175	875
Capacitor Start-Induction Run	1/3 HP	2020	720
	1/2 HP	3075	975
	3/4 HP	4500	1400
	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
Capacitor Start-Capacitor Run	1-1/2 HP	8100	2000
	5 HP	23300	6000
	7-1/2 HP	35000	8000
	10 HP	46700	10700
Fan Duty	1/8 HP	1000	400
	1/6 HP	1400	550
	1/4 HP	1850	650
	1/3 HP	2400	800
	1/2 HP	3500	1100

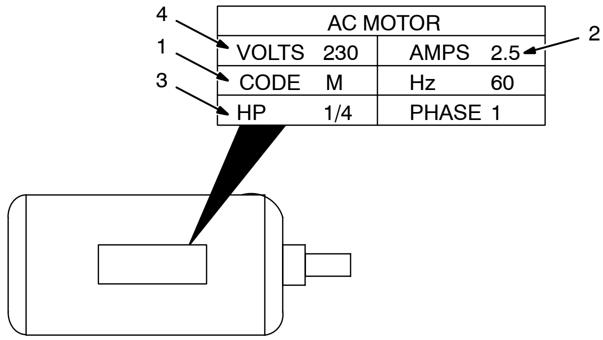
11-6. Approximate Power Requirements For Farm/Home Equipment

Farm/Home Equipment	Rating	Starting Watts	Running Watts
Stock Tank De-Icer		1000	1000
Grain Cleaner	1/4 HP	1650	650
Portable Conveyor	1/2 HP	3400	1000
Grain Elevator	3/4 HP	4400	1400
Milk Cooler		2900	1100
Milker (Vacuum Pump)	2 HP	10500	2800
FARM DUTY MOTORS	1/3 HP	1720	720
Std. (e.g. Conveyors,	1/2 HP	2575	975
Feed Augers, Air	3/4 HP	4500	1400
Compressors)	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
High Torque (e.g. Barn	1-1/2 HP	8100	2000
Cleaners, Silo Unloaders,	5 HP	23300	6000
Silo Hoists, Bunk Feeders)	7-1/2 HP	35000	8000
	10 HP	46700	10700
3-1/2 cu. ft. Mixer	1/2 HP	3300	1000
High Pressure 1.8 Gal/Min	500 PSI	3150	950
Washer 2 gal/min	550 PSI	4500	1400
2 gal/min	700 PSI	6100	1600
Refrigerator or Freezer		3100	800
Shallow Well Pump	1/3 HP	2150	750
	1/2 HP	3100	1000
Sump Pump	1/3 HP	2100	800
	1/2 HP	3200	1050

11-7. Approximate Power Requirements For Contractor Equipment

Contractor	Rating	Starting Watts	Running Watts
Hand Drill	1/4 in	350	350
	3/8 in	400	400
	1/2 in	600	600
Circular Saw	6-1/2 in	500	500
	7-1/4 in	900	900
	8-1/4 in	1400	1400
Table Saw	9 in	4500	1500
	10 in	6300	1800
Band Saw	14 in	2500	1100
Bench Grinder	6 in	1720	720
	8 in	3900	1400
	10 in	5200	1600
Air Compressor	1/2 HP	3000	1000
	1 HP	6000	1500
	1-1/2 HP	8200	2200
	2 HP	10500	2800
Electric Chain Saw	1-1/2 HP, 12 in	1100	1100
	2 HP, 14 in	1100	1100
Electric Trimmer	Standard 9 in	350	350
	Heavy Duty 12 in	500	500
Electric Cultivator	1/3 HP	2100	700
Elec. Hedge Trimmer	18 in	400	400
Flood Lights	HID	125	100
	Metal Halide	313	250
	Mercury	1000	
	Sodium	1400	
	Vapor	1250	1000
Submersible Pump	400 gph	600	200
Centrifugal Pump	900 gph	900	500
Floor Polisher	3/4 HP, 16 in	4500	1400
	1 HP, 20 in	6100	1600
High Pressure Washer	1/2 HP	3150	950
	3/4 HP	4500	1400
	1 HP	6100	1600
55 gal Drum Mixer	1/4 HP	1900	700
Wet & Dry Vac	1.7 HP	900	900
	2-1/2 HP	1300	1300

11-8. Power Required To Start Motor



1 Motor Start Code
2 Running Amperage
3 Motor HP
4 Motor Voltage

To find starting amperage:

Step 1: Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

Step 2: Find Motor HP and Volts.

Step 3: Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

Single-Phase Induction Motor Starting Requirements

Motor Start Code	G	H	J	K	L	M	N	P
KVA/HP	6.3	7.1	8.0	9.0	10.0	11.2	12.5	14.0

$$\frac{\textbf{kVA/HP x HP x 1000}}{\textbf{VOLTS}} = \textbf{STARTING AMPERAGE}$$

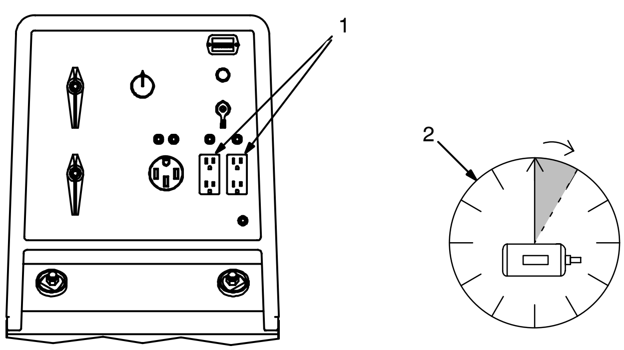
EXAMPLE: Calculate the starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

Volts = 230 HP = 1/4 Using Table, Code M results in kVA/HP = 11.2

$$\frac{11.2 \text{ x } 1/4 \text{ x } 1000}{230} = 12.2 \text{ A}$$ **Starting the motor requires 12.2 amperes.**

S-0624

11-9. How Much Power Can Generator Supply?



1 Limit Load To 90% Of Generator Output

Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

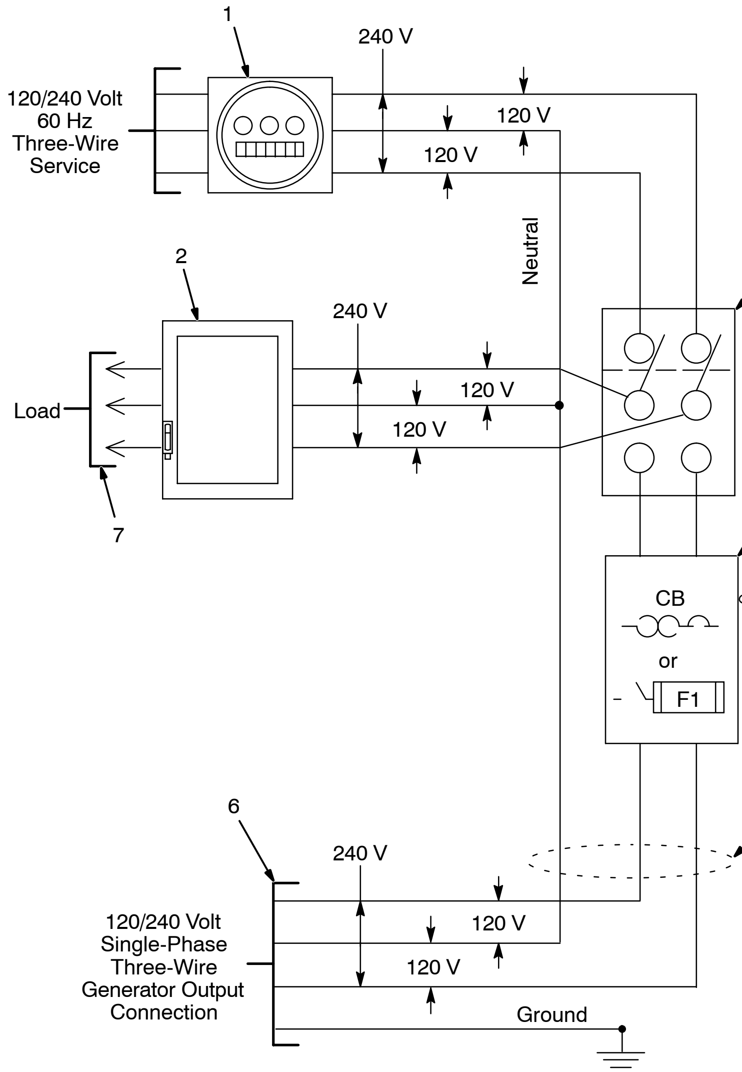
2 5 Second Rule

If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

Ref. ST-800 396-A / S-0625

11-10. Typical Connections To Supply Standby Power

☞ *Customer-supplied equipment is required if generator is to supply standby power during emergencies or power outages.*



☞ *Item 4 is not necessary if circuit protection is already present in welding generator auxiliary power output circuit.*

1 Power Company Service Meter

2 Main and Branch Overcurrent Protection

3 Double-Pole, Double-Throw Transfer Switch

Obtain and install correct switch. Switch rating must be same as or greater than the branch overcurrent protection.

4 Circuit Breakers or Fused Disconnect Switch

Obtain and install correct switch.

5 Extension Cord

Select as shown in Section 11-11.

6 Generator Connections

Connect terminals or plug of adequate amperage capacity to cord. Follow all applicable codes and safety practices.

Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.

7 Load Connections

S-0405-A

11-11. Selecting Extension Cord (Use Shortest Cord Possible)



Cord Lengths for 120 Volt Loads

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	600			350 (106)	225 (68)	137 (42)	100 (30)
7	840		400 (122)	250 (76)	150 (46)	100 (30)	62 (19)
10	1200	400 (122)	275 (84)	175 (53)	112 (34)	62 (19)	50 (15)
15	1800	300 (91)	175 (53)	112 (34)	75 (23)	37 (11)	30 (9)
20	2400	225 (68)	137 (42)	87 (26)	50 (15)	30 (9)	
25	3000	175 (53)	112 (34)	62 (19)	37 (11)		
30	3600	150 (46)	87 (26)	50 (15)	37 (11)		
35	4200	125 (38)	75 (23)	50 (15)			
40	4800	112 (34)	62 (19)	37 (11)			
45	5400	100 (30)	62 (19)				
50	6000	87 (26)	50 (15)				

*Conductor size is based on maximum 2% voltage drop

Cord Lengths for 240 Volt Loads

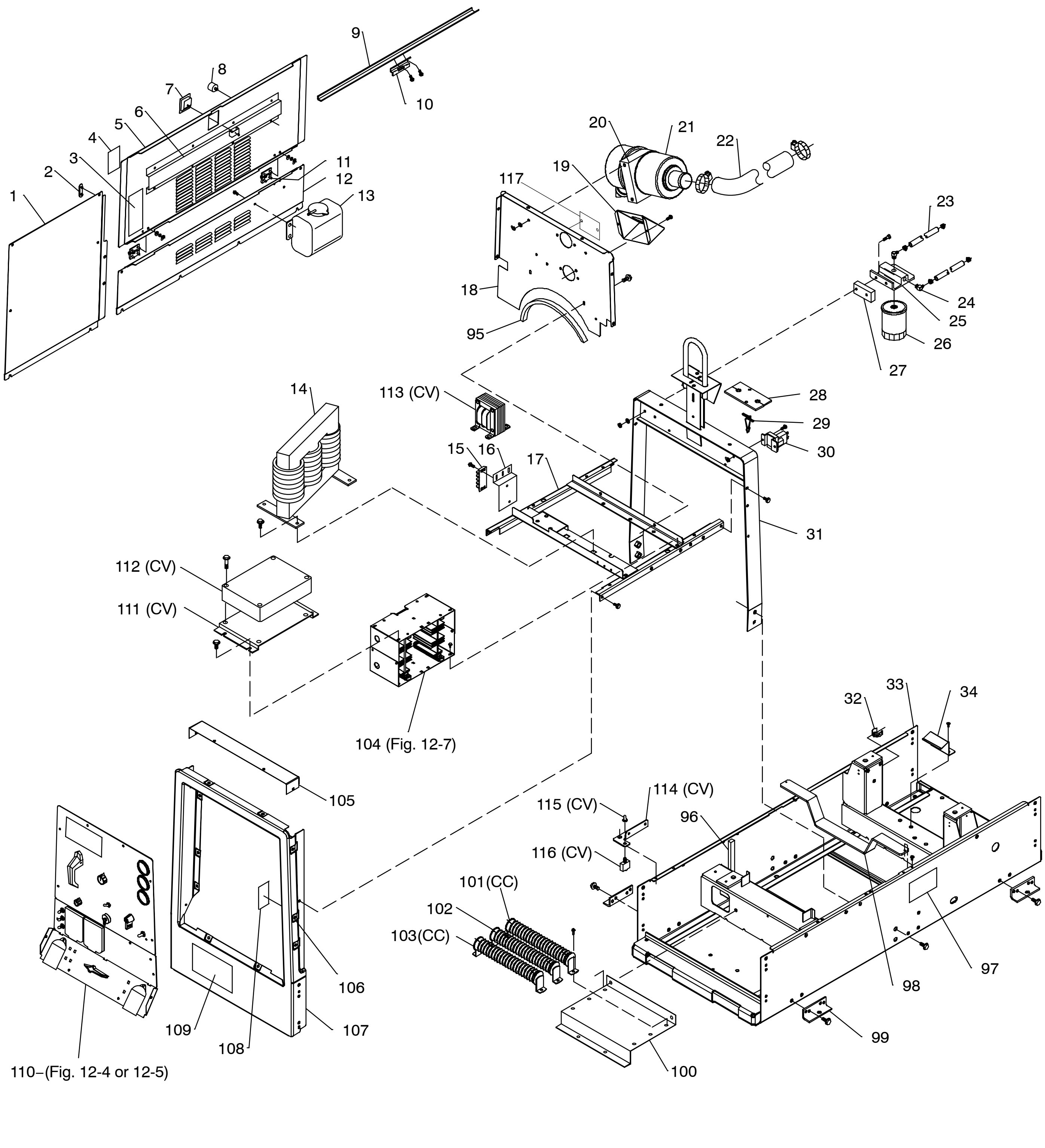
▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	1200			700 (213)	450 (137)	225 (84)	200 (61)
7	1680		800 (244)	500 (152)	300 (91)	200 (61)	125 (38)
10	2400	800 (244)	550 (168)	350 (107)	225 (69)	125 (38)	100 (31)
15	3600	600 (183)	350 (107)	225 (69)	150 (46)	75 (23)	60 (18)
20	4800	450 (137)	275 (84)	175 (53)	100 (31)	60 (18)	
25	6000	350 (107)	225 (69)	125 (38)	75 (23)		
30	7000	300 (91)	175 (53)	100 (31)	75 (23)		
35	8400	250 (76)	150 (46)	100 (31)			
40	9600	225 (69)	125 (38)	75 (23)			
45	10,800	200 (61)	125 (38)				
50	12,000	175 (53)	100 (31)				

*Conductor size is based on maximum 2% voltage drop

SECTION 12 – PARTS LIST

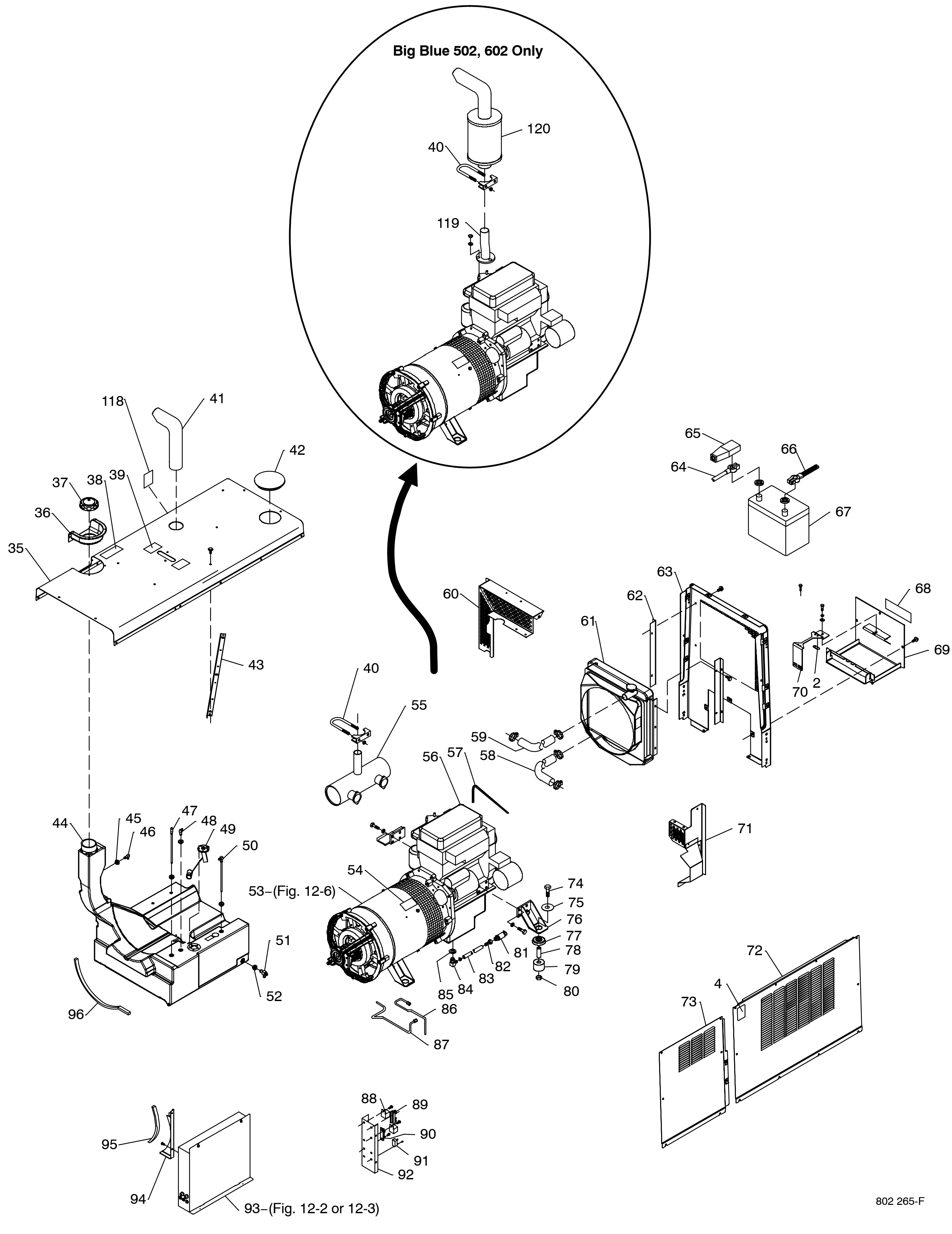
☞ *Hardware is common and not available unless listed.*



CC CC Models Only

CV CC/CV Models Only

Figure 12-1. Main Assembly



Big Blue 502, 602 Only
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93–(Fig. 12-2 or 12-3)
802 265-F

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 12-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
1		189 824	PANEL, gen LH	1
2		087 341	BUMPER, door 1.000 OD x .750	4
3		190 518	LABEL, diesel engine maintenance Perkins	1
4		191 623	LABEL, warning all panels must be in place while running	2
5		+189 825	DOOR, engine access	1
6		190 572	STIFFENER, engine access door	1
7		190 126	LATCH, paddle series 20	1
8		191 626	BUMPER, door engine access	2
9		190 076	CHANNEL, stiffener engine access	1
10		190 992	KEEPER, latch engine access door	1
11		189 975	HINGE, door access 180deg	2
12		189 826	PANEL, rocker	1
13		190 190	TANK, coolant recovery	1
14	Z1	189 395	REACTOR, ac	1
15	1T	038 621	BLOCK, term 30A 4 pole frict term str	1
		038 620	LINK, jumper term blk 30A	2
		190 260	HARNESS, unit weld control (consisting of)	1
	PLG3	166 680	.. CONNECTOR, (kit) rect univ 084 12P/S 3 row plug cable	1
		187 654	.. SEAL, wire univ 12P/S 3 row	1
	PLG6	141 270	.. CONNECTOR, (kit) rect univ 084 4P/S 1 row plug cable lkg	1
16		081 499	BRACKET, mtg strip terminal	1
17		188 600	FRAME, mtg reactor and rectifier	1
18		189 708	FIREWALL, top	1
19		190 182	PANEL, side air box	1
20		189 763	BRACKET, mtg air cleaner	1
21		189 764	AIR CLEANER, intake	1
		*192 938	FILTER, air element primary	1
		*♦192 939	FILTER, air element safety	1
22		189 618	HOSE, air cleaner	1
23		107 816	HOSE, SAE .250 ID x .500 OD xc oil (order by ft)	5ft
		134 835	HOSE, SAE .312 ID x .560 OD xc oil (order by ft)	4ft
24		145 282	FITTING, hose brs barbed elbow M 5/16tbg x 1/4NPT	2
25		192 750	BASE, fuel filter w/adapter	1
26		*192 744	FILTER, fuel spin-on	1
27		192 741	BLOCK, spacer mtg filter base	1
28		189 464	SEAL, weather lift eye	1
29		191 460	CLIP, spring lift eye	1
30	CR8	155 309	CONTACTOR, solenoid 12VDC cont 400A inrush	1
31		188 947	FRAME ASSEMBLY, center upright	1
32		192 362	BRACKET, mtg nyl 1/2 conduit	1
33		+189 154	BASE	1
34		196 220	BRACKET, hold down fuel tank rear	1
35		+193 684	COVER, top (Big Blue 402 only)	1
35		+189 706	COVER, top, (Big Blue 502, 602 only)	1
36		189 052	GROMMET, plastic neck filler fuel (consisting of)	1
37		190 198	.. CAP, tank screw-on 3.500 in w/vent	1
38		107 990	LABEL, use diesel fuel only	1
39		108 487	LABEL, warning falling equipment	2
40		010 875	CLAMP, muffler 2.000 dia	1
41		105 734	PIPE, muffler extension elbow 9Big Blue 402 only)	1
42		191 176	PLUG, radiator access	1
43		191 354	SUPPORT, cover	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 12-1. Main Assembly (Continued)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
44		189 245	TANK, fuel 23gal (consisting of)	1
45		124 253	.. BUSHING, tank fuel	4
		084 173	.. CLAMP, hose .460 − .545clp dia slfttng	2
46		189 912	.. FITTING, stl barbed elbow w/.047 in orf zinc pld	1
47		189 909	.. FITTING, stand pipe hose .250 x 9.260 lg 90deg zinc	1
48		189 913	.. FITTING, stl barbed elbow zinc pld	1
49		190 142	.. SENDER, fuel gauge 9.7500 deep tank	1
50		189 910	.. FITTING, stand pipe hose .3125 x 9.260 lg 90deg zinc	1
51		189 908	.. VALVE, drain fuel 180deg	1
52		181 572	.. BUSHING, tank fuel	1
53		Figure 12-6	GENERATOR	1
54		013 367	LABEL, warning moving parts	2
55		193 314	MANIFOLD, exhaust muffler (Big Blue 402 only)	1
56		190 238	ENGINE, Perkins dsl elec 3.152	1
		*192 936	FILTER, oil	1
		*192 744	FILTER, fuel spin-on	1
		*192 937	FILTER, fuel secondary	1
		*195 615	SWITCH, coolant temperature	1
		*195 616	SWITCH, oil pressure	1
57		*193 163	BELT, fan	1
58		189 621	HOSE, radiator lower	1
59		189 622	HOSE, radiator upper	1
60		+192 345	GUARD, fan assembly LH	1
		147 923	LABEL, warning moving parts	2
61		190 189	RADIATOR, w/shroud and 7# cap 3 row core	1
		605 982	CAP, radiator pressure 7 lb	1
62		189 878	BRACKET, mtg radiator	2
63		189 717	UPRIGHT, rear Perkins	1
64		190 207	CABLE, bat pos 45 in lg No. 1 awg w/clamp and .406rng	1
65		108 081	TERMINAL PROTECTOR, battery post mtg	2
66		190 206	CABLE, bat neg 42 in lg No. 2 awg w/clamp and .375rng	1
67		190 896	BATTERY, stor 12V 650crk 110rsv gp 24	1
68		168 385	LABEL, warning battery explosion can blind	1
69		+189 290	BATTERY BOX	1
70		189 293	HOLD DOWN, battery	1
71		+192 343	GUARD, fan RH	1
		147 923	LABEL, warning moving parts	2
72		+189 828	PANEL, engine side RH	1
73		189 827	PANEL, gen RH	1
74		199 849	SCREW, 625-11 x 4.00hexhd pln gr 5 pld	4
75		071 731	WASHER, flat .656 ID x 2.250 OD x .187T stl pld	4
76		189 146	BRACKET ASSEMBLY, mtg RH Perkins	1
		189 150	BRACKET ASSEMBLY, mtg LH Perkins	1
77		071 890	RETAINER, mount eng/gen	4
78		071 730	TUBING, stl .875 OD x 12ga wall x 2.500	4
79		083 476	MOUNT, eng/gen nprn .875 ID x 2.500 OD x 2.000	4
80		135 205	NUT, 625-11 .94hex .76H stl pld elastic stop nut	4
		199 505	HOSE, oil drain assy 32 in (consisting of)	1
81		165 271	.. VALVE, oil drain 3/8-18NPTF	1
82		176 529	.. FITTING, hose brs barbed fem 1/2tbg x 3/8NPT	1
83		113 854	.. HOSE, SAE .500 ID x .780 OD xc oil (order by ft)	3ft
84		191 610	FITTING, hose stl elbow .500tbg x 3/4-16	1
85		190 180	WASHER, flat .750 ID x 1.250 OD x .125T stl	1
86		191 499	LINE, fuel return	1
		191 608	FITTING, cprsn brs nut 1/4tbg	1
		191 606	FITTING, cprsn brs sleeve 1/4tbg	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 12-1. Main Assembly (Continued)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
87		191 500	LINE, fuel supply	1
		191 609	FITTING, flrd stl invt nut 5/16tbg	1
		191 607	FITTING, cprsn brs sleeve 5/16tbg	1
88	CR1, CR2	090 104	RELAY, encl 12VDC SPST 30A/15VDC spin flange mtg	2
		190 252	HARNESS, engine control (consisting of)	1
89	6T	190 210	BLOCK, term 5-3-3	1
90	D8/C8	189 701	DIODE/CAPACITOR BOARD	1
91	CB10	190 374	CIRCUIT BREAKER, auto reset 12VDC 40A	1
		148 850	SOCKET, relay 5 pin	3
	PLG7	168 071	CONNECTOR, (kit) rect univ 084 9P/S 3 row plug cable lkg	1
	PLG4	166 680	CONNECTOR, (kit) rect univ 084 12P/S 3 row plug cable lkg	1
		187 654	SEAL, wire univ 12P/S 3 row	1
92		190 196	PANEL, mtg components	1
93		Figure 12-2, Figure 12-3	CONTROL BOX ASSEMBLY	1
94		189 731	FIREWALL, lower	1
95		173 352	EXTRUSION, rubber clamp/bulb (order by ft)	3ft
96		191 446	EXTRUSION, rubber w/adhesive 1.000 x 1.000 D (order by ft)	6ft
97		190 250	LABEL, warning do not weld on base	2
98		191 512	BRACKET, hold down fuel tank	1
99		191 897	BRACKET, mtg unit	4
100		190 179	PANEL, mtg components	1
101	R4	c_C191 292	RESISTOR, WW fxd 375W 50 ohm w/mtg bkt	1
102	R3	189 699	RESISTOR, WW tap 375W 10 ohm w/mtg bkt	1
103	R2	c_C189 699	RESISTOR, WW tap 375W 10 ohm w/mtg bkt	1
104		Figure 12-7	MAIN RECTIFIER ASSEMBLY	1
105		191 448	TOP, cover front upright	1
106		190 058	NUT, .250-20 u-nut multi-thread	19
		049 525	NUT, 312-18 u-nut multi-thread	32
107		+188 946	UPRIGHT, front	1
108		190 010	LABEL, caution do not use ether	1
109		134 792	LABEL, warning general precautionary	1
110		Figure 12-4, Figure 12-5	PANEL, front w/components	1
111		c_V193 453	BRACKET, mtg box fcr	1
112	PC1	c_V189 143	MODULE, field current regulator	1
113	T1	c_V192 371	XFMR, 115V pri 24vct 8A w/leads	1
114		c_V193 138	BRACKET, mtg circuit breaker	1
115		c_V190 323	BOOT, circuit breaker clear hex nut	1
		c_V193 185	HARNESS, transformer (consisting of)	1
116	CB6	c_V083 432	CIRCUIT BREAKER, man reset 1P 10A 250VAC frict	1
	RC11	c_V167 640	CONNECTOR, (kit) rect univ 084 4p/s 1 row rcpt cable/panel lkg	1
117		191 307	COVER, plate	1
118		176 230	LABEL, warning hot exhaust	1
119		189 535	PIPE, exhaust (Big Blue 502, 602 only)	1
120		105 740	Muffler, exhaust engine 1.925 inlet/outlet (Big Blue 502,602 only)	1
		190 469	KIT, label (includes safety and informational labels)	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 190 469.

*Recommended Spare Parts.

c_C CC models only.

c_V CC/CV models only.

♦ Optional

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

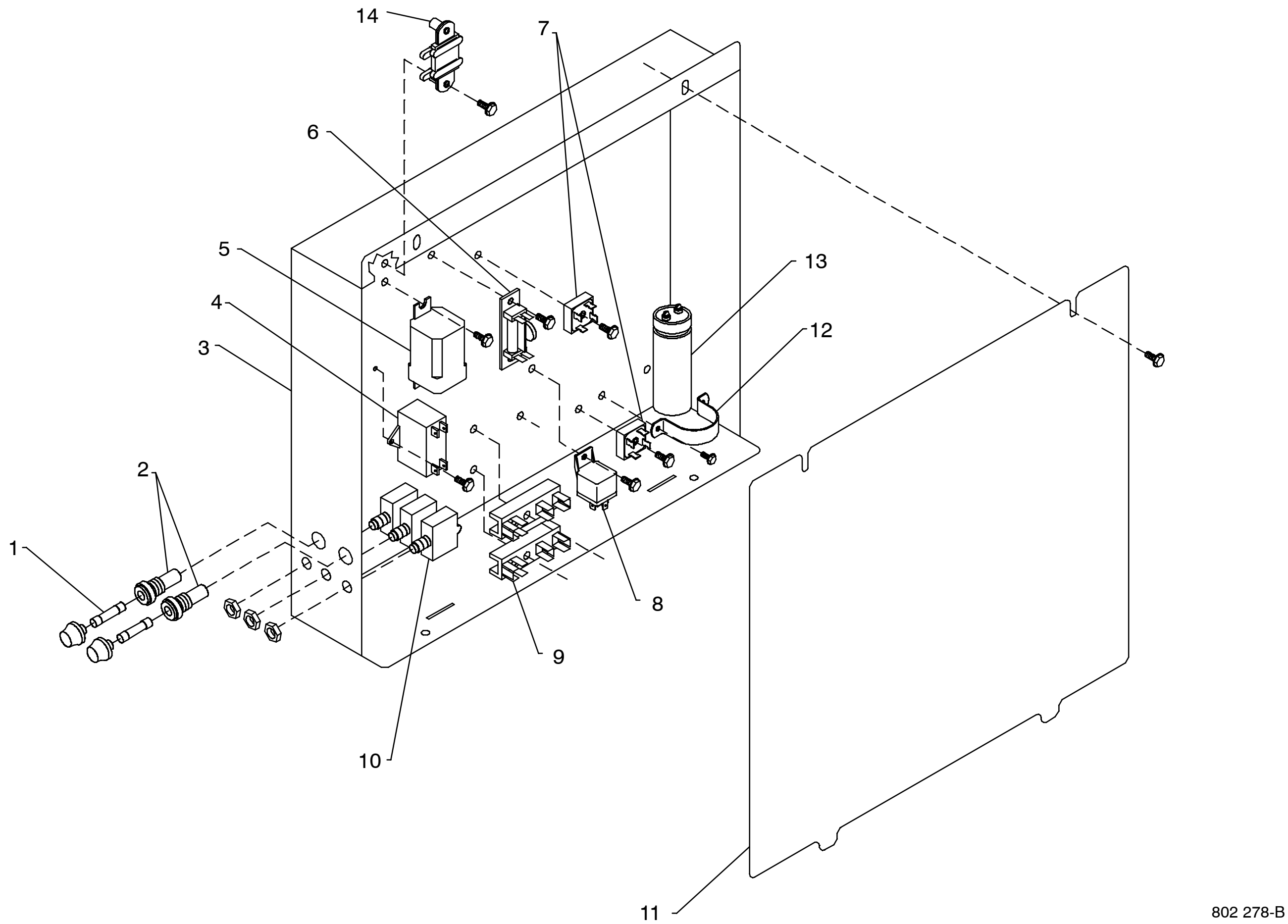


Figure 12-2. Control Box Assembly – CC Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 12-2. Control Box Assembly – CC Models (Figure 12-1 Item 93)	
... 1	... F1, F2 ..	*085 874 ..	FUSE, mintr cer slo-blo 10A 250V	2
... 2	....	046 432 ..	HOLDER, fuse mintr .250 x 1.250	2
... 3	....	189 385 ..	CONTROL BOX	1
....	....	190 253 ..	HARNESS, control box, weld control (consisting of)	1
... 4	.... C12 ...	191 944	CAPACITOR, polyp met film 10. uf 250 vac 10%	1
... 5	.... CR7 ...	188 636	RELAY, OCV control	1
... 6	... D1/C1 ..	189 701	DIODE/CAPACITOR BOARD	1
... 7	.. SR1, SR2 .	035 704	RECTIFIER, integ 40A 800V	2
... 8	.... CR5 ...	090 104	RELAY, encl 12VDC SPST 30A/15VDC	1
... 9	.... 2T, 3T ..	190 210	BLOCK, term 5-3-3	2
....	RC5 ...	147 663	CONNECTOR, (kit) rect univ 084 15P/S 3 row rcpt cable/panel lkg	1
....	RC3, RC4 .	166 679	CONNECTOR, (kit) rect univ 084 12P/S 3 row rcpt cable/panel lkg	2
....	... RC1, 2, 7 .	168 071	CONNECTOR, (kit) rect univ 084 9P/S 3 row rcpt cable/panel lkg	3
... 10	CB11, 12, 13	139 266	CIRCUIT BREAKER, man reset 1P 15A 250VAC frict	3
... 11	....	194 483 ..	COVER, control box	1
... 12	....	177 136 ..	CLAMP, capacitor 1.375dia	1
... 13	..... C9	087 110 ..	CAPACITOR, elctlt 240uf 200VDC	1
... 14	..... R6	141 424 ..	RESISTOR, ww fxd 30 w 25 ohm faston te	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

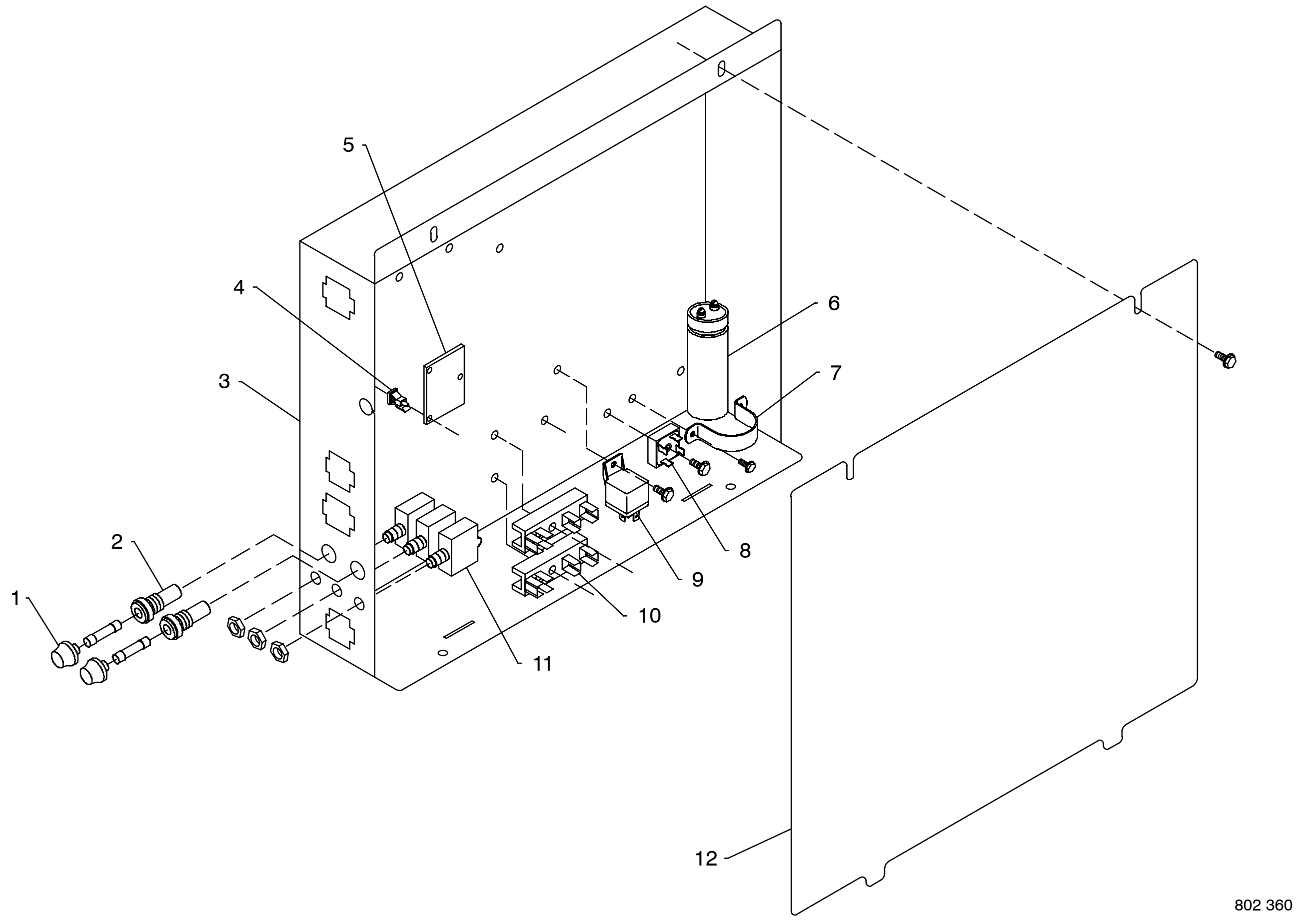


Figure 12-3. Control Box Assembly – CC/CV Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 12-3. Control Box Assembly – CC/CV Models (Figure 12-1 Item 93)	
... 1	F1, F2	*085 874	FUSE, mintr cer slo-blo 10A 250V	2
... 2		046 432	HOLDER, fuse mintr .250 x 1.250	2
... 3		189 385	CONTROL BOX	1
... 4		134 201	STAND-OFF, support pc card	3
... 5	PC9	192 224	CIRCUIT CARD ASSY, display	1
... 6	C9	087 110	CAPACITOR, elctlt 240uf 200VDC	1
... 7		177 136	CLAMP, capacitor 1.375dia	1
		197 745	HARNESS, control box, cv weld control (consisting of)	1
... 8	SR1	035 704	.... RECTIFIER, integ 40A 800V	1
... 9	CR5	090 104	.... RELAY, encl 12VDC SPST 30A/15VDC	1
... 10	2T, 3T	190 210	.... BLOCK, term 5-3-3	2
	RC5	147 663	.... CONNECTOR, (kit) rect univ 084 15P/S 3 row rcpt cable/panel lkg	1
	RC3, RC4	166 679	.... CONNECTOR, (kit) rect univ 084 12P/S 3 row rcpt cable/panel lkg	2
	RC1, 2, 7	168 071	.... CONNECTOR, (kit) rect univ 084 9P/S 3 row rcpt cable/panel lkg	3
... 11	CB11, 12, 13	139 266	.... CIRCUIT BREAKER, man reset 1P 15A 250VAC frict	3
... 12		194 483	COVER, control box	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

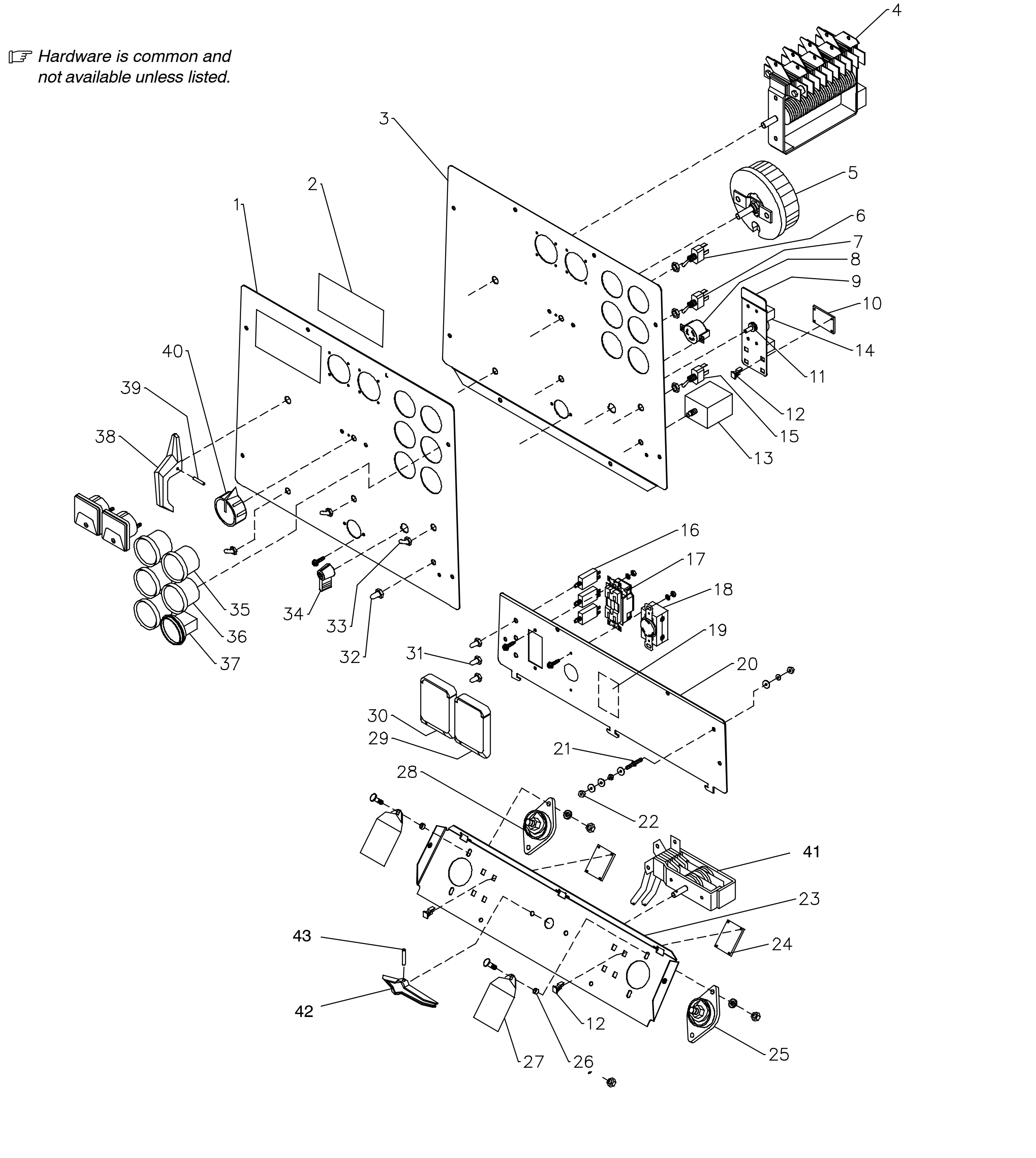


Figure 12-4. Panel, Front w/Components − CC Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 12-4. Panel, Front w/Components − CC Models (Figure 12-1 Item 110)	
1		191 631	PLATE SCREENED, ident control rating; when ordering this item, the nameplate should also be ordered)	1
2			NAMEPLATE, screened (order by model and serial number)	1
3		191 359	PANEL, engine/weld control	1
4	S3	189 382	SWITCH, range/changeover	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 12-4. Panel, Front w/Components − CC Models (Continued)				
	RC6	192 558	HARNESS, range (consisting of)	1
		148 439	.. HOUSING, rect univ 084 4p/s 1 row rcpt	1
5	R1	188 635	RHEOSTAT, WW 300W 34 ohm	1
		190 254	HARNESS, front panel weld control (consisting of)	1
6	S6	011 611	.. SWITCH, tgl DPDT 15A 125VAC on-none-on spd term chr	1
7	S5	011 609	.. SWITCH, tgl SPDT 15A 125VAC on-none-on spd term chr	1
8	RC13	032 897	.. RECEPTACLE, twlk grd 2P3W 15A 125V	1
		177 859	.. CONNECTOR, body 5 terminal (to engine control switch S1)	1
	PLG2	168 071	.. CONNECTOR, (kit) rect univ 084 9P/S 3 row plug cable lkg	1
		187 651	.. SEAL, wire univ 9P/S 3 row	1
9		191 308	BRACKET, terminal strip	1
10	PC8	189 744	CIRCUIT CARD ASSEMBLY, filter hf	1
11	S1	176 606	SWITCH, ignition 4posn w/o handle	1
12		134 201	STAND-OFF, support	12
		190 257	HARNESS, front panel engine control (consisting of)	1
13	MS1	189 698	.. SWITCH, magnetic manual reset low current	1
14	4T, 5T	190 210	.. BLOCK, term 5-3-3	2
15	S2	021 467	.. SWITCH, tgl SPST 3A 250V off-none-on spd term	1
		135 275	.. CONNECTOR, (kit) rect univ 084 15P/S 3 row plug cable lkg	1
		153 501	.. CONNECTOR, (kit) rect univ 039 6P/S 3 row	5
		187 655	.. SEAL, wire univ 15P/S 3 row	1
		197 758	HARNESS, auxiliary power (consisting of)	1
16	CB1,2,3	093 996	.. CIRCUIT BREAKER, man reset 1P 20A 250VAC frict	3
17	GFCI1	151 981	.. RECEPTACLE, str dx grd 2P3W 15/20A 125V GFCI	1
18	RC1	147 632	.. RECEPTACLE, tw lk grd 2P3W 30A 250V L6-30R	1
19		190 861	LABEL, warning electric shock and moving parts	1
20		+191 357	PANEL, aux pwr	1
21		083 030	STUD, brs .250−20 x 1.750 w/hex collar	1
22		601 836	NUT, 250−20 .50hex .19h brs	3
23		191 340	PANEL, mtg terminal pwr output	1
24	PC4, PC5	189 744	CIRCUIT CARD ASSEMBLY, filter hf	2
25		039 046	TERMINAL, pwr output black	1
		180 735	WASHER, output stud	2
26		181 169	SPACER, output stud	2
27		186 621	BOOT, generic output stud	2
28		039 047	TERMINAL, pwr output red	1
29		193 260	COVER, receptacle 2.250 dia lexan	1
30		193 258	COVER, receptacle GFCI	1
31		190 323	BOOT, circuit breaker clear hex nut	3
32		193 143	BOOT, magnetic shutdown switch	1
33		021 385	BOOT, toggle switch lever	2
34		119 014	LEVER, switch black	1
35	PL1	191 241	LED, red 12V 4 ind lights panel mtg round	1
36	FUEL	191 242	GAUGE, fuel elec switch	1
37	HM	118 058	METER, hour 12-24VDC 2.25dia	1
38		189 161	HANDLE, switch range	1
39		010 647	PIN, spring CS .156 x 1.250	1
40		148 723	KNOB, pointer	1
41	S12	♦195 825	SWITCH, polarity	1
42		♦059 773	HANDLE, switch	1
43		♦010 647	PIN, spring cs .156 x 1.250	1
		♦196 073	LABEL, do not switch while welding	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 190 469.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

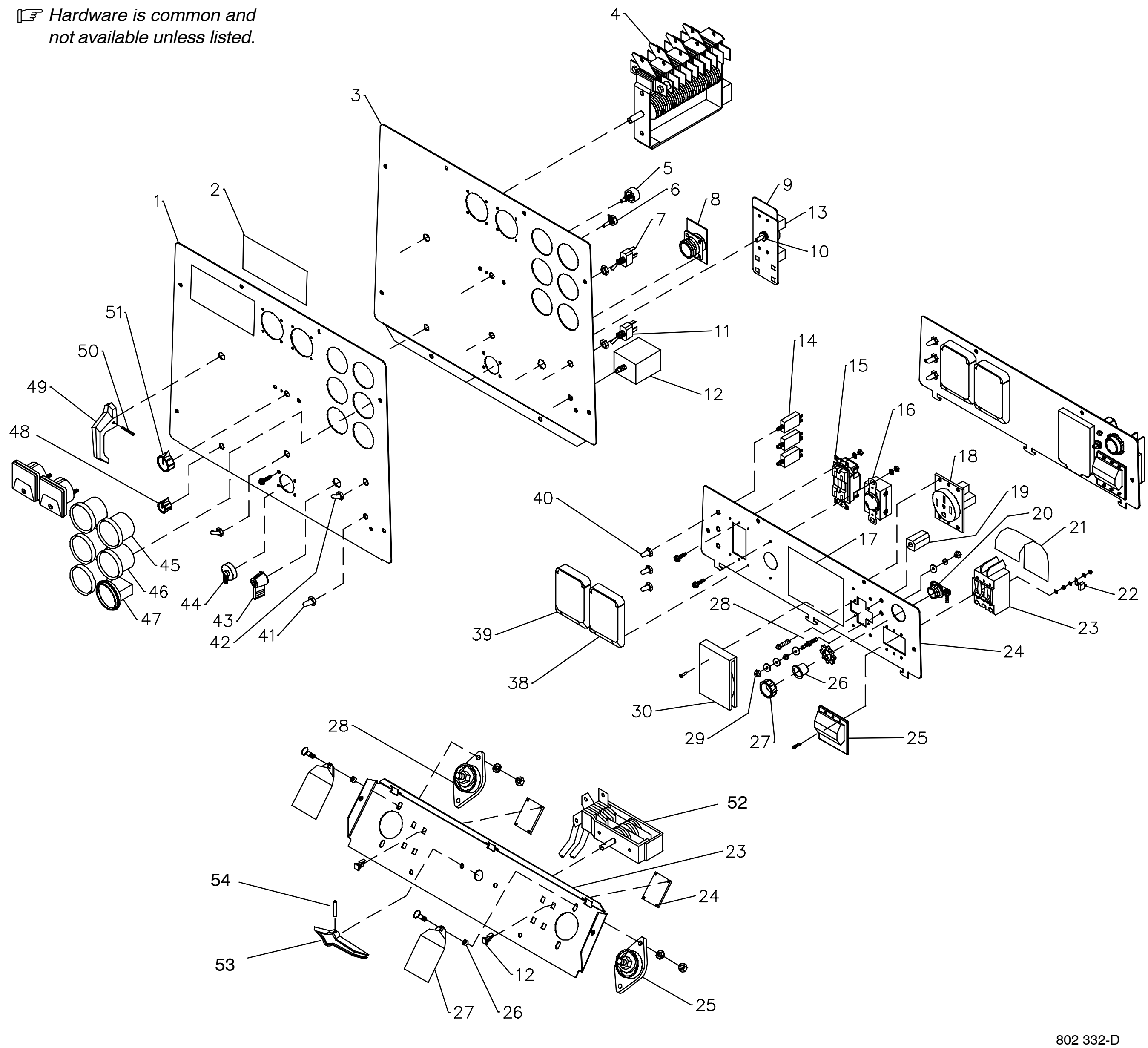


Figure 12-5. Panel, Front w/Components – CC/CV Models

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 12-5. Panel, Front w/Components – CC/CV Models (Figure 12-1 Item 110)	
... 1		192 895	PLATE SCREENED, ident control ; when ordering this item, the nameplate should also be ordered)	1
... 2			NAMEPLATE, screened (order by model and serial number)	1
... 3		191 359	PANEL, engine/weld control	1
... 4	S3	189 382	SWITCH, range/changeover	1
	RC6	192 558	HARNESS, range (consisting of)	1
		148 439	.... HOUSING, rect univ 084 4p/s 1 row rcpt	1
... 5	R1	193 118	POT, cp flat 1t 2w 1k ohm linear	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
		193 159	HARNESS, front panel weld control CV (consisting of)	1
6	S6	193 234	SWITCH, rotary 6 position gold contacts	1
7	S5	011 609	SWITCH, tgl SPDT 15A 125VAC on-none-on spd term chr	1
	PLG S1	177 859	CONNECTOR, body 5 terminal (to engine control switch S1)	1
	PLG9	193 183	CONNECTOR, rect cinch 18 pin	1
	PLG10	153 501	CONNECTOR, (kit) rect univ 039 6pp/s 3 row plug cable lkg	1
	PLG14	165 668	CONNECTOR, (kit) rect metrmate 10 skt 1 row plug/cable lkg	1
	PLG2	168 071	CONNECTOR, (kit) rect univ 084 9p/s 3 row plug cable lkg	1
		187 651	SEAL, wire univ 9P/S 3 row	1
	PLG11	114 063	CONNECTOR, rect univ 084 4p/s 1 row plug cable lkg	1
8	PC6	192 995	CIRCUIT CARD ASSY, connector/receptacle	1
9		191 308	BRACKET, terminal strip	1
10	S1	176 606	SWITCH, ignition 4posn w/o handle	1
		190 257	HARNESS, front panel engine control (consisting of)	1
11	S2	021 467	SWITCH, tgl SPST 3A 250V off-none-on spd term	1
12	MS1	189 698	SWITCH, magnetic manual reset low current	1
13	4T, 5T	190 210	BLOCK, term 5-3-3	2
		135 275	CONNECTOR, (kit) rect univ 084 15P/S 3 row plug cable lkg	1
		153 501	CONNECTOR, (kit) rect univ 039 6P/S 3 row	5
		187 655	SEAL, wire univ 15P/S 3 row	1
		197 758	HARNESS, auxiliary power (consisting of)	1
14	CB1,2,3	093 996	CIRCUIT BREAKER, man reset 1P 20A 250VAC frict	3
15	GFCI1	151 981	RECEPTACLE, str dx grd 2P3W 15/20A 125V GFCI	1
16	RC1	147 632	RECEPTACLE, tw lk grd 2P3W 30A 250V L6-30R	1
17		190 861	LABEL, warning electric shock and moving parts	1
17		♦197 399	LABEL, warning 3 ph auxiliary power	1
18	RC5	♦182 954	RCPT, str 3P4W 50A 125/250V	1
19		♦025 248	STAND-OFF, insul .250-20 x 1.2	1
20		♦604 102	CONNECTOR, clamp cable 1.000	1
21		♦197 527	GUARD, circuit breaker	1
22		♦197 363	TERMINAL, ring tng screw clamp	3
23	CB7	♦196 780	CIRCUIT BREAKER, man reset 3p	1
24		+191 357	PANEL, auxiliary power	1
24		+♦191 358	PANEL, auxiliary power (full kVA option)	1
25		♦196 781	BOOT, circuit breaker 3 pole	1
26		♦197 508	PLUG, protective	1
27		♦077 440	BUSHING, conduit 1 in	1
28		083 030	STUD, brs .250−20 x 1.750 w/hex collar	1
29		601 836	NUT, 250−20 .50hex .19h brs	3
30		♦197 291	COVER, receptacle w/gasket	1
	CT2	♦197 433	TRANSFORMER, current sensing	1
31		191 340	PANEL, mtg terminal pwr output	1
32	PC4, PC5	189 744	CIRCUIT CARD ASSEMBLY, filter hf	2
33		039 046	TERMINAL, pwr output black	1
		180 735	WASHER, output stud	2
34		134 201	STAND-OFF, support	12
35		181 169	SPACER, output stud	2
36		186 621	BOOT, generic output stud	2
37		039 047	TERMINAL, pwr output red	1
38		193 260	COVER, receptacle 2.250 dia lexan	1
39		193 258	COVER, receptacle GFCI	1
40		190 323	BOOT, circuit breaker clear hex nut	3
41		193 143	BOOT, magnetic shutdown switch	1
42		021 385	BOOT, toggle switch lever	2
43		119 014	LEVER, switch black	1
44		170 391	CONN, circ ms protective cap size 20	1
45	PL1	191 241	LED, red 12V 4 ind lights panel mtg round	1

Figure 12-5. Panel, Front w/Components − CC/CV Models (Continued)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 12-5. Panel, Front w/Components – CC/CV Models (Continued)				
46	FUEL	191 242	GAUGE, fuel elec switch	1
47	HM	118 058	METER, hour 12-24VDC 2.25dia	1
48		097 922	KNOB, pointer .875 dia x .250 ID w/set screws plstc	1
49		189 161	HANDLE, switch range	1
50		010 647	PIN, spring CS .156 x 1.250	1
51		097 924	KNOB, pointer 1.625 dia x .250 ID w/set scrws plstc	1
		193 158	HARNESS, unit weld control – CV (consisting of)	1
	PLG6	136 810	.. CONNECTOR, (kit) rect univ 084 4p/s 1 row plug cable lkg	1
	PLG8	193 184	.. CONNECTOR, rect cinch 30 pin	1
	PLG13	148 439	.. CONNECTOR, (kit) rect univ 039 10p/s 2 row plug cable	1
	PLG3	166 680	.. CONNECTOR, (kit) rect univ 084 12p/s 3 row plug cable	1
		088 731	.. BUSHING, snap-in nyl .375 ID x .500 mtg hole	1
		135 873	.. CLIP, conduit convoluted 1/2 in mtg hole	2
		187 654	.. SEAL, wire univ 12p/s 3 row	1
		024 103	BLANK, snap-in nyl .750 mtg hole blk	1
52	S12	♦195 825	SWITCH, polarity	1
53		♦059 773	HANDLE, switch	1
54		♦010 647	PIN, spring cs .156 x 1.250	1
		♦196 073	LABEL, do not switch while welding	1

\+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 190 469.

♦Optional

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

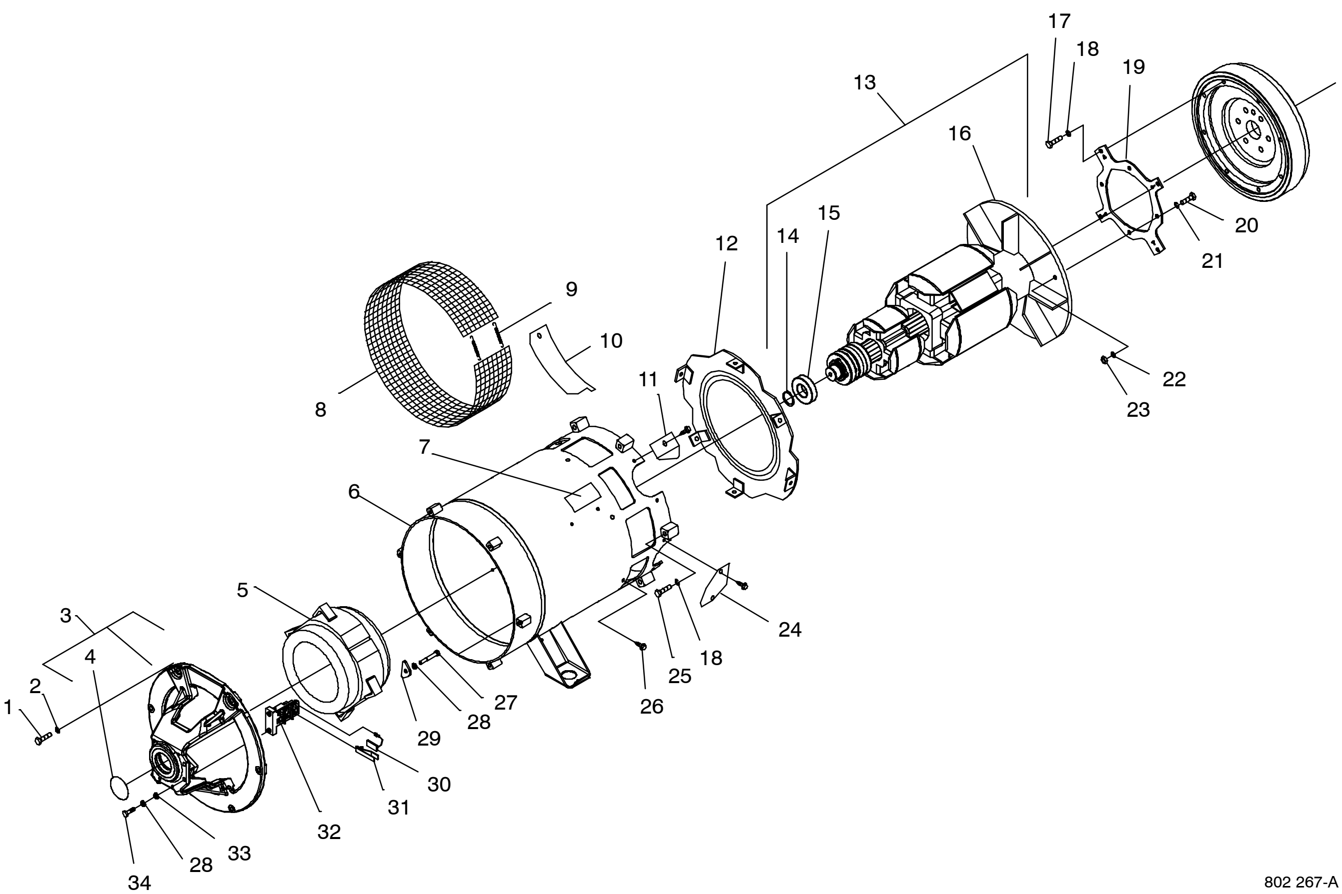


Figure 12-6. Generator

Item No.	Dia. Mkgs.	Part No.	Description	Quantity

Figure 12-6. Generator (Figure 12-1 Item 53)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
1		132 053	SCREW, 375-16 x 1.50hexhd pln gr 5pld	6
2		183 387	WASHER, conical spring .406 ID x .875 OD pltd	6
3		195 911	ENDBELL, gen (consisting of)	1
4		143 220	O-RING, 2.859 ID x .139CS	1
5		190 464	STATOR, exciter/aux pwr	1
6		+191 478	STATOR, weld assembly complete	1
6		+♦197 334	STATOR, weld assembly complete (full kVA option)	1
7		013 367	LABEL, warning moving parts	2
8		190 197	GUARD, generator wire mesh	1
9		172 674	SPRING, ext .240 OD x .041 wire x 3.500pld	2
10		191 580	COVER, starter hole	1
11		191 576	GUARD, starter Perkins	1
12		039 207	BAFFLE, air	1
13		198 627	ROTOR, gen (consisting of)	1
14		024 617	RING, rtng ext 1.375 shaft x .050thk	1
15		053 390	BEARING, ball rdl sgl row 1.370 x 2.830 x .6	1
16		195 547	FAN, rotor gen	1
17		049 026	SCREW, M10-1.5 x 25hexhd pln 8.8pln	8
18		083 883	WASHER, lock .042 ID x 0.709 OD	8
19		194 468	PLATE, flex	1
20		605 231	SCREW, M10-1.5 x 35hexhd pln 8.8pln	4
21		194 512	WASHER, flat 1.250 OD x .406 ID x 7 ga thk stal pld	4
22		183 387	WASHER, cone .380 ID x .860OD x .109t stl pld 4000lbs	4
23		198 631	NUT, m10 hex lock nut stl pld	4
24		191 579	COVER, starter hole Perkins/Continental	1
25		172 555	SCREW, M10-1.5 x 50hexhd pln 8.8pld	6
26		602 159	SCREW, .312-18 X .75hexwhd	2
27		601 961	SCREW, .312-18 x 2.25hexhd pln gr 5pld	4
28		602 211	WASHER, lock .318 ID x 0.586	2
29		139 341	WASHER, exciter	4
30		*190 823	BRUSH, contact	3
31		188 560	CLIP, spring	3
32		189 142	BRUSHHOLDER ASSEMBLY, gen	1
33		602 242	WASHER, flat .375idx0.875odx.083t stl pld	2
34		604 534	SCREW, 312−18X1.25 hex hd−pln gr5 pld	2
		190 259	HARNESS, brush (consisting of)	1
	PLG1	168 071	CONNECTOR, (kit) rect univ 084 9P/S 3 row plug cable lkg	1
		187 651	SEAL, wire univ 9P/S 3 row	1

+ When ordering a component originally displaying a precautionary label, the label should also be ordered. Order label individually or as part of Label Kit 190 469.

*Recommended Spare Parts.

♦Optional

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ Hardware is common and not available unless listed.

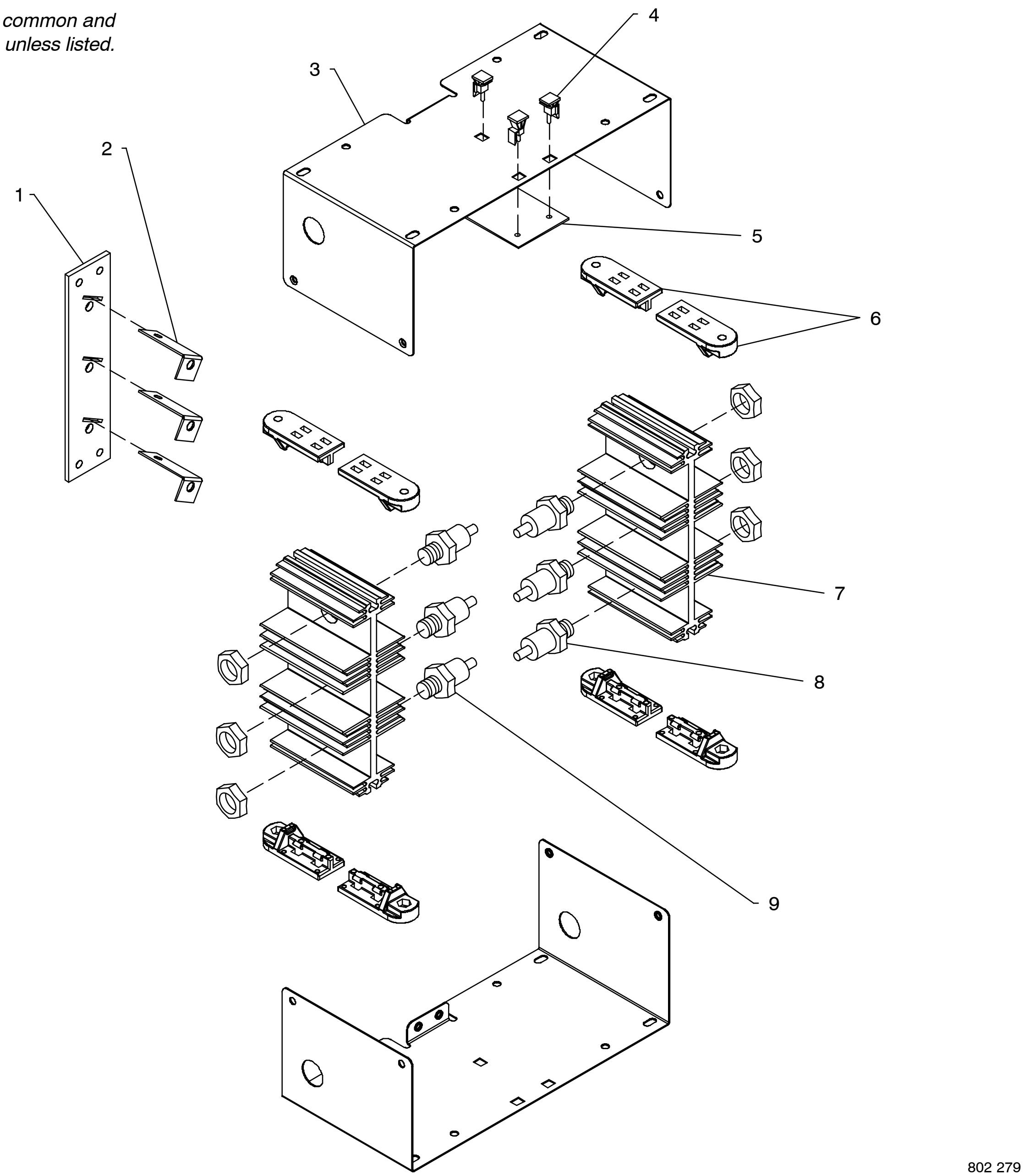


Figure 12-7. Main Rectifier Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 12-7. Main Rectifier Assembly (Figure 12-1 Item 104)	
... 1	....	188 137 ..	CONNECTION BOARD, rectifier AC	1
... 2	....	188 517 ..	BUS BAR, connection board	3
... 3	....	188 135 ..	ENCLOSURE, rectifier	2
... 4	....	134 201 ..	STAND-OFF, support	3
... 5	.... PC3 ...	188 610 ..	CIRCUIT CARD ASSEMBLY, protection	1
... 6	....	188 136 ..	INSULATOR, heat sink	8
... 7	....	188 493 ..	HEAT SINK, rectifier al	2
... 8	. D3, D5, D7	037 956 ..	DIODE, rect 275A 300V SP	3
... 9	. D2, D4, D6	037 957 ..	DIODE, rect 275A 300V RP	3

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes

TRUE BLUE® WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Miller® The Power of Blue.

Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip

Resources Available

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

To locate a distributor or service agency near you, call 1-800-4-A-Miller or visit our website at www.MillerWelds.com

- Welding Supplies and Consumables
- Options and Accessories
- Personal Safety Equipment
- Service and Repair
- Replacement Parts
- Training (Schools, Videos, Books)
- Technical Manuals (Servicing Information and Parts)
- Circuit Diagrams
- Welding Process Handbooks

Contact the Delivering Carrier for:

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

File a claim for loss or damage during shipment.

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